R. M. T. S. REGISTER

FEBRUARY, 1903

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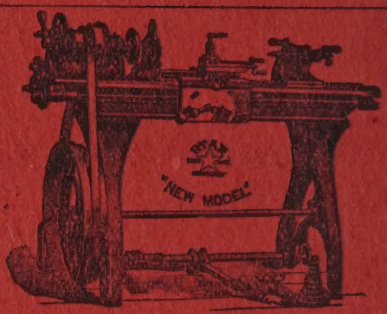

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AN OPEN LETTER

TO THE

Graduates, Past Members and Friends of the Rindge Manual Training School.

One of the white stones in the pathway of every man's life is the day when he leaves the family roof-tree and becomes a self supporting man. On that day, his heart and the hearts of his friends should rejoice because he has accomplished that goal towards which the efforts of his parents have been directed, and they should be doubly glad because he has vindicated the trust of his country, which demands that every citizen shall be a free and independent man.

We acknowledge these truths when applied to the individual man, and it is but a short step in advance when we connect them with the lives of institutions as well.

One of the institutions which lies nearest the hearts of us all is the Rindge Manual Training School, where we learned that first knowledge in the essentials of life, which has stood us in such good stead in these later years. Such an institution can never, of course, be self supporting, but there are certain features and departments which might well be independent.

Now, the object of this letter is not an appeal for alms, but is primarily to let every man know that the last few years in our school, have NOT been ones of stagnation, but years of growth, in which this spirit of independence has waxed strong, and achieved results. One of the greatest of these has been the placing of the management of athletics on a firm business basis. This has been the result of graduates and undergraduates working in

harmony together. Other things have been accomplished, and this first issue of the New Register is a still further advance along the same lines.

The paper now has an assured financial footing, but it wants your subscription, not so much for the monetary value of the thing, as for the moral support which a solid Alumni backing will give.

The situation crystalizes down into a simple equation of the following terms :

All the other subscriptions + yours = success.

As it now stands, you are the unknown quantity. Evidently, it's up to you.

We, as members of the graduate body, trust you have caught the spirit of this movement, and that you clearly understand that, although now you are not part in the school, you must always be part of the school.

JOHN W. WOOD JR., '93
AUGUST G. GUTHEIM, '96
WILLIAM J. GREENE, '97
W. THORNING WOOD, '97
CHARLES M. ABBOTT, '97
HERBERT M. DUTCHER, '97
ERNEST B. MacNAUGHTON, '98
HERBERT E. RAYMOND, '98
WALTER E. HADLEY, '00
REGINALD WENTWORTH, '00

R. M. T. S. Register

VOL. XI. CAMBRIDGE, MASS., FEBRUARY, 1903. NO. 1.

The R. M. T. S. Register is published monthly, from October to July inclusive, by the pupils of the Rindge Manual Training School, Irving Street. Price, 5 cents per copy; 40 cents per year.

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Editorials

In again publishing the Register the Editors necessarily face some difficulties, but they are depending on every fellow in the School for his support both by subscription and material. They want every one to feel that he has a hand in publishing the paper and to have some pride in placing it in the front rank of school publications. It is their intention to make it a true chronicle of all news about the School, and as such will contain very interesting reading matter for all who are or have been connected with the School and are interested in its growth.

A number of graduates have expressed their regret that a school so prominent as the Rindge Manual Training School should have no paper edited by its pupils, and we may be sure that we have in those graduates fellows who are greatly interested and will give their support in every way possible. Let us make the paper a connecting link between the graduates and the undergraduates.

Anything which you think ought to be printed in the Register, please hand to one of your class editors. Original themes and stories will be greatly appreciated and are earnestly solicited by the Editors. The greater the number who are represented by articles in these columns, the more interesting the paper will be.

This being the eleventh anniversary of the publishing of the first issue of the Register, it will doubtless be interesting to all of our readers to note some of the changes which have taken place in the School between that time and this. In this review, however, we are taken so far back, let us go a little farther and form an outline of the whole history of the Cambridge M. T. S. and its successor, the Rindge M. T. S. The School is one of three generous gifts to the city by Mr. Frederick H. Rindge, a former resident. Mr. Rindge built the school and supported it for ten years. The construction of the main building was commenced on July 12, 1888, and the School, at that time known as the Cambridge Manual Training School, was opened on the first day of October following. Mr. Harry Ellis was appointed superintendent and held that position until his death, on April 1, 1895. He was held in greatest esteem by all the pupils, and his death, which was quite sudden at the last, was a great shock to all. Each fellow felt that he had lost a personal friend. Mr. Chas. H. Morse succeeded to the position of head master and still holds that position.

The High School studies were at first held in the old High School (corner of Broadway and Fayette street) and the pupils marched back and forth under military discipline. The first class to graduate was that of '91. This class, however, was unable to complete the full course because of the unfinished condition of the building when they entered. Those who received diplomas in '92 were the first to complete the whole course, but it was the class of '93 who first issued the Register, a four-page sheet, published semi-monthly.

The fire drill, which everyone knows about if he knows anything about the School, was organized in 1891 by Mr. Ellis. The drill was not compulsory at first, but was participated in by nearly all the pupils. It continued as a part of the course until the city took charge of the School in 1899, and the fellows gained considerable renown as the boy firemen.

The band and the glee club need no introduction in this article, for who is there who does not know both? Unfortunately neither have flourished of late, but steps are now being taken for the reorganization of the band and some efforts have also been made in the interest of a new glee club.

We must not neglect to mention Camp Rindge, so dear to many of the former pupils. This summer camp, situated on Cow Island in Lake Winnepesaukee, was first organized

in '91 and furnished much enjoyment to the boys at a cost well within the reach of all. A small fleet of row boats and a steam launch formed a "navy," and the camp was under military discipline.

The School has grown so rapidly from the very beginning that it has now almost outgrown the shops, especially the machine shop, and it will be quite a relief when these are enlarged. In '93 a building was erected in the rear of the main building for academic purposes, but since 1900 the School has been entirely separated from the High School, and these rooms were very crowded previous to the completion of the new Washington building. Four rooms of this magnificent new structure are now used by the classes of the Training School and the remainder by the Washington Grammar School. Eventually the whole will be utilized by the Training School. The three buildings are heated from the boilers in the main building and that this might be done it was necessary to put in two large new boilers of 110 H. P. each to replace the old ones of fifty or sixty H. P. The three buildings are connected by subways.

The teaching force in the mechanical department is the same as it has been, but on the academic side there is an increase of seventy-five per cent. over what there was the first year after the separation from High School.

The course of instruction was never so thorough and complete as it is now. As a preparation for any higher scientific school it is much in advance of the High School, and with the exception of Latin it will fit one for the regular classical college course. For the sake of comparason we publish two courses; the one used previously to 1898, and the present course.

We would call the attention of our readers to the advertisements. Make them a part of the reading matter, and then when you have anything to buy consider those first who advertise in your paper.

Indirectly we learn that the business manager of a neighboring publication does not know about the reality of the Register. We have no doubt that we can show him conclusively that it has come again, is a success, and is here to stay.

COURSES PREVIOUS TO 1898

FIRST YEAR

English High School	*Hours per week*	*Months*	*Manual Training School*	*Hours per week*	*Months*
			Class IV.		
Elementary Algebra	5	10	Drawing	5	10
English History	3	7	Carpentry and Joinery	10	5
Civics	3	3	Iron-Fitting	10	5
English Language " Literature	2	10			

SECOND YEAR

			Class III.		
Geometry	3	10	Drawing	5	10
Physics	5	10	Wood Turning and Pattern Making	10	5
English Language " Literature	2	10	Blacksmithing Casting	10	5

THIRD YEAR Class II.

1	Advanced Algebra	5	6	Drawing (alternate days)	10	5
	Geometry	5	4	Machine Shop "	10	5
2	Physics	2	10			
	Chemistry	3	10			
French		5	10			
English Language		3	10			
" Literature						

(Option between 1 and 2)

FOURTH YEAR Class I.

1	Solid Geometry	5	10	Drawing (alternate days)	10	5
	Reviews in Math.			Machine Shop "	10	5
2	Chemistry	5	10			
	Botany					
English Language		3	10			
" Literature						
U. S. History						
French		5	10			

(Option between 1 and 2)

PRESENT COURSE

FIRST YEAR Class IV.

College and General Courses	*Hours per week*	*Month*
Algebra	5	10
English	5	10
English History	5	10
Physiology		
Shop Work	10	10
Drawing		
Study	5	10

SECOND YEAR Class III.

College and General Courses	*Hours per Week*	*Month*
French	5	10
Geometry	3	10
English	2	10
Drawing	5	10
Shop Work	10	10
Study	5	10
Algebra		

THIRD YEAR Class II.

General Course			*College Course*		
Physics	5	10	Algebra and Geometry	5	10
French	5	10	French	5	10
English	5	10	English	5	10
History			History		
Drawing	10	10	Drawing	10	10
Shop Work			Shop Work		
Study	5	10	Study	5	10

FOURTH YEAR Class I.

General Course			*College Course*		
Chemistry	5	10	Advanced French	5	10
Physics	3	10	English	5	10
Civil Government	2	10	Solid Geometry		
English	5	10	Physics	10	10
Drawing	10	10	Shops (alternate days)	5	10
Shop Work			Drawing		
Study	5	10	Trig.	5	10
			German		

C. M. T. S. Band

Through the efforts of Mr. John J. MacKenzie and a few other members of the Band, that important feature of the School has been reorganized, after a quiet spell of about six months.

At a meeting held in the School, Monday evening, January 26, Mr. Flockton, director of the "Waltham Watch Band," was chosen leader, Mr. John J. MacKenzie, manager, and a committee of three (Messrs. Doherty, Langley and Crane) was chosen to draw up a new constitution. Mr. T. P. Clarke presided.

Alumni

Pres. R. A. Harlow, of the Alumni Association, has appointed John W. Wood, Jr., '93, Charles M. Abbot, '97, and Vincent M. Frost, '98, to serve as a committee to prepare and issue a revised list of members.

In a recent civil service examination at City Hall, in which men from the three city high schools and Harvard competed, three Training School graduates headed the list. The three fortunate men are John McKenzie, '98, August Gutheim, '96, and T. Parker Clarke, 1900.

Class of '98 holds a dinner, Feb. 5, at the Quincy House.

Ernest O. Garret, '97, is now the proud possessor of an "Ichobod," Jr.

Frank Spencer, '98, has accepted an important civil service position in Washington.

At the recent city election Jeremiah F. Downey, '95, was elected a member of the Common Council. His friends will be pleased to learn of his recovery from his recent serious accident.

Geo. W. Wells, '93, founder of the Register, is now in Atlanta, Ga., as manager of the Gen. Electric Company's headquarters in that section.

Wm. A. Bradford, '94, has recently been elected first lieutenant of Co. K, 8th Regt. Infantry, M. V. M.

J. H. Hewitt, '92, is teaching manual training in the Philippine Islands. Richard Phelps, '96, is teaching in California.

Albert Harris, '96, is with the Lackawanna Iron and Steel Co., Buffalo, N. Y.

Alfred R. Lincoln, '97, Harvard, 1902, is now teaching mathematics in the Springfield High School with Mr. Warren.

R. C. Harlow, '92, is manager of the Colonial Rubber Co., Plymouth, Mass.

Geo. Swett, 1900, has been elected president of the Senior Class, M. I. T.

W. E. Hadley, 1901, is business manager of "Technique," the annual Junior publication of the Mass. Institute of Technology. Reginald Wentworth, of the same class, is business manager of the college paper, "The Tech."

F. A. Kolster, 1902, is with the Wireless Telegraphy Experimental Station.

School Notes

One of the best known and brightest pupils in the Freshman Class is Birger Hammairan. When his father came over to this coutnry to study dentistry he brought with him Birger, then fourteen years old. Birger had never heard the English tongue until he landed. He was sent by his father to this School and was put in Division B of the Fourth Class. He showed great aptitude for our language and he is now able to read and speak it quite fluently. While in the High School at Stockholm he held high rank in his classes and had completed three and a half of the nine years it takes to go through the course.

M—s—n to Instructor, pointing to induction machine: "Mr. Wood, will that machine knock you sensible?" This may sound familiar to some Seniors.

R. M. T. S. Fishing and Swimming Club. Place: Either of the subways. Time: Any rainy day.

If "Je" Boyle and "Ja" Brooks don't stop cracking jokes they are in great danger of dying of "Bright" disease.

To "Sunny Jim" H——: Did you "catch the scheme" while watching for a hole in the drawing-room wall?

Unlimited Engagement!!!
of Operatic Stars,
Under able management of
Mr. J. M. Hussey.
Soloists:—
J. A. Smyth,
G. E. Crosby.

"Mustard," Chisolm, is an unrelished dainty with the class of 1904.

Teacher: "What is the mechanical advantage of a bicycle?"
L—n—l—y: "You can sit down."

Pfaff says that a lunch counter is to be run in the machine shop, because they handle hot dogs.

Wanted.
A new machine to give the Senior civics class the "tip" to "Look pleasant, please," when Mr. Morse, after explaining a difficult question, asks: "Do you get it?"

Yes, Stewart, that note book she gave you is very pretty.

Clark should not have lady callers during business hours.

A Mystery.
Why is it that so many of the Freshman Class fall asleep during school hours?

The Solution.
We think they must greatly miss the extra half hour they used to enjoy in the morning.

Mr. Telfer has just completed an attachment to the emery wheel in the forge shop which will make it easier for those who wish to sharpen their own skates. This will be appreciated by the members of the hockey team as well as by many others.

Will some one please explain to Fo—ter how the boilers are lubricated?

"In time of peace prepare for war"; a good old saying, and, judging from the activity of 1904 in manufacturing cannon, a war must be in the near future.

Munday and Co., toymakers.

We are informed that Pa—y is building an auto-bicycle.

One of the Senior Class remarked, a few days ago, on the number of unused electric bells. "Oh, you must remember," answered the other, that this is a boys' school, and we need some "bells" around; and as we don't have any "ringers" here, we must make up the deficiency somehow.

An Original Poem.

(Tune: In the Good Old Summer Time.)

O, the good old anthracite! oh, the good old anthracite,
When it costs about six "bones," we will purchase some;
We need it bad, the same's the rest, but that's not half a sign
That we'll have some before we're in the "Good Old Summer Time."

Last year for the first time in a number of years the Senior Class of the Training School gave a dance. It was a complete success. This year the class of 1903 has decided to run a drama and dance, and they promise even greater success than that of last year. Look for particulars in the next issue.

Athletics

The Fotball Season of 1902.

The football season of 1902 is past and it is one to be remembered by friends of Interscholastic sport, for it furnished many surprises to close followers of the game.

We rejoice in the fact that our team won the championship of the Senior Interscholastic League; and the cup comes to the School for the first time since '94.

At the beginning of the season the outlook was bright but dubious, paradoxical as this may sound. Bright because we had six of last year's men as a nucleus, and dubious as we had no one to coach and slim means of securing any one.

For several weeks the squad struggled on under the teachings of Capt. Fletcher, whose unflagging energy and determination are well worthy of remembrance. But without a coach few teams can hope to succeed and interest is soon lost in the work. But still the team played two games, Medford High and St. Mark's Schools, the former game ending in a tie, 5 to 5, and the latter in a victory for our team, 17 to 0. Finally a coach was secured and regular practice was now indulged in, the work each night being varied and systematic. In a crude state and by pure individual playing, Everett High School was defeated 12 to 0. This ended the practice games, for the season was well advanced and the Interscholastic games were near, as well as those of the Triangular League. The outlook was none too bright, for in spite of the fact that

we had good material, it seemed to develop slowly.

Cambridge High was the first Interscholastic team, and we won by a score of 22 to 0. But our defense was woefully weak and our play was ragged. Still the team persevered, learning one thing at a time, and by a little extra time spent in the defense we beat Cambridge Latin in the Triangular League 11 to 0. The next game in this league was with Cambridge High, and they went down to defeat a second time, the score being 16 to 0.

The next great problem was, "Can R. M. T. S. beat E. H. S.?" The majority of soothsayers said "No," and the outcome of the game seemed in great doubt. But on the 7th of November the strong E. H. S. team, which was the universal choice for first place, succumbed after forty-five minutes of play marked by almost excessive roughness. The score was 16 to 11, and it was only our determination which finally won out.

At this the team's stock took a decided jump, and those who had prophesied our certain defeat looked somewhat surprised.

Malden and Dorchester High Schools proved none too hard, the former being beaten 17 to 5 and the latter 16 to 6.

But the real work of the year loomed up before us; and that for which we had hoped and prayed since '98—victory over Somerville—seemed a long way off with such a team as ours. Yet hard practice and a desire to perfection is bound to bring good results.

Thanksgiving Day, 1902, will, perhaps, never be forgotten by those who played in that game, and will long be remembered by those who saw it. For the first time since S. H. & L. joined the Interscholastic League she was beaten by R. M. T. S. Our superiorty in every department of the game was unquestioned, and the score, 17 to 5, gave evidence of the fact.

On the whole we may trace our success to two things, viz.: Hard work and determination; and few, very few, seasons of football at R. M. T. S. have passed off more successfully. The do-and-die spirit, which is proverbially characteristic of Training School, was never more fully exemplified, and no team more fully deserved the championship than ours, which started out under uncertain prospects and ended in a blaze of glory. Much praise is due Coach Harris for his faithful work in preparing the team for its most successful season for several years.

HOCKEY

This year's Hockey team, like the champion team of last year, is proving itself very fast. It has won four of the five games played, its only defeat being at the hands of the Harvard Varsity. On Jan. 5th, at Spy Pond, Training School defeated a Somerville Picked Team 5-0 in one 15-minute period.

R. M. T. S.	Somerville Picked Team
Telford, f.	f, J. Cassidy
Boyson, f,	f, M. Cassidy
Odell, f,	f, Wenthworth
Park, f,	
Wire, c. p.,	c. p., Burton
Boyle, p,	p, Crocker, Holloff
Brooks, g.	g, Babbitt

Goals: Odell 2, Boyson 2, Telford 1.

Jan. 6. The team was defeated by the Harvard Varsity 6-0 in a fast game. Training School put up a great game for schoolboys, the defence doing especially good work.

Harvard	R. M. T. S.
Foster, f	f, Telford
Souther, f	f, Boyson

Lovering (Capt.) f	f, Odell
McLeod, f	f, Cleveland, Park
Clothier, c. p.	c. p., Wire
Carr, p	p, Boyle
Litchfield, g	g, Brooks

Referee, Stoddard of Yale. Goals: Foster 2, Souther 1, Lovering 2, McLeod 1. Time 20m periods.

Jan. 14. Training School visited Broadway Playground and defeated Somerville 8-0, in a practice game.

R. M. T. S.	Somerville High.
Telford, f	f, Burton
Boyson, f	f, M. Cassidy
Odell, f	f, Wentworth
Park, f	f, Beane
Wire, c. p.	c. p., J. Cassidy, capt
Boyle, p	p, Babbitt
Brooks, g	g, Baldwin

Goals: Boyson 3, Odell 3, Parks 2. Time 20 min. periods.

Jan. 20. Training School played her first league game with Melrose on Ell Pond. The game was very fast and rough and there was no scoring until the last half when Telford scored on a pass from Odell. Melrose protested the goal, but the protest was settled by the Board of Appeals in favor of Training School.

R. M. T. S.	Melrose High
Telford, f	f, Scanlon, capt.
Boyson, f	f, Collins, Verge
Odell, f	f, Buckman
Cleveland, f	f, Cochrane
Wire, c. p.	c. p., Anderson
Boyle, p.	p, Willis
Brooks, g	g, Harris

Goal: Telford. Referee, Martin. Goal umpires, Smith, Curson. Timer, Woodcock. Time, 20 min. periods.

Jan. 24 Cambridge Latin was defeated on Spy Pond 2-0 in the first triangular league game. Training School did not play her usual fast game. Brooks and Crocker excelled.

R. M. T. S.	Camb. Latin
Telford, f	f, Taylor
Boyson, f	f, F. Taft
Odell, f	f, Rogers
Cleveland, f	f, Potter
Wire, c. p.	c. p., R. Taft
Boyle, p	p, Bunton
Brooks, g	g, Crocker, capt.

Goals: Boyson 1, Odell 1. Referee, Crawford. Goal umpires, Chase and Murray. Time, 20 min. periods.

Jan. 27. Cambridge High was defeated by the very small score of 2-0, and as usual R. M. T. S. won the championship of the Triangular league. The ice was covered with water and slush which made fast skating impossible. This explains the small score.

R. M. T. S.	Camb. High
Telford, f	f, Russell
Boyson, f	f, Pierce, capt.
Odell, f	f, Boynton
Cleveland, f	f, Smith
Wire, Park, c. p	c. p., Dunn
Boyle, p	p, Teele
Brooks, g	g, Church

Goals: Cleveland 2. Referee, Taft. Goal umpires, Beard, Allen. Time, 20 min. periods.

The A. A. Meeting

The annual meeting of the R. M. T. S. Athletic Association was held in the school hall, Friday evening, January 23, 1903.

As a new constitution was thought necessary, one was drawn up by a committee of graduates and was presented to the meeting for adoption. With a few minor changes it was accepted as presented.

After the adoption of the constitution, the following officers for the ensuing year were elected: President, John W. Wood, Jr.; vice-president, Arthur J. Cox, '03; treasurer, Wilbur B. Sprague; graduate representatives, Ernest B. MacNaughton, William J. Greene, Charles M. Abbott; for class representatives, Arthur J. Cox, '03; George E. Crosby, '04; Edwin L. Derby, Jr., '05; and Kennedy Park, '06.

President Wood then presented the question of the formation of a new league for discussion. After a discussion favorable to breaking connection with the Senior Inter-

scholastic league, on motion of Mr. Morse, the matter was referred to the Executive Committee with full powers, and instructions to appoint a delegation to consist of one instructor, one undergraduate, and two graduates to meet like delegations from other schools to organize a new athletic league.

Then came the very interesting part of the meeting: the presentation of the championship Football cup, won so handsomely by our team. The presentation was made by Mr. George Sawin, '97, captain of the '96 football team. He spoke of the team as being the "real thing" as regards the showing it made during the past season, and presented the cup to Mr. A. M. Fletcher, the captain of the victorious eleven.

The latter responded by saying how honored he felt in being the captain of such a team, and heartily thanked the fellows who played and the coaches for the excellent work that they did for the team.

The meeting then adjourned. Following is the treasurer's report. The constitution is omitted in this issue because of lack of room, but will appear in the March number.

1902.				
Oct. 1.	Balance on hand		$144.07	
	Expenses. UNPAID BILLS			
	Wright & Ditson	$52.90		
	Iver Johnson Co.	52.63		
	Horace Partridge Co.	8.95		
	Cambridge Chronicle (printing)	3.00		
			127.48	
Oct. 1.	Net balance on hand			$16.59
21.	Cambridge E. H. S. (I.S.F.B.A.)			
	Our share of total receipts		7.56	
	Expenses			
	Police	$ 2.00		
	Official	3.00		
	Printing	.50		
			5.50	
	Net gain			2.06
24	Cambridge Latin (Triangular)			
	Our share of total receipts		14.85	
	Expenses			
	Police	$ 2.00		
	Official	5.00		
	Printing	.50		
	Car fares and linemen	1.35		
			8.85	
	Net gain			6.00
30.	Cambridge E. H. S. (Trian. League)			
	Our share of total receipts		3.75	
	Expenses			
	Printing	$ .50		
	Official	5.00		
			5.50	
	Net loss			$1.75
Nov. 7	Boston English High (I.S.F.B.A.)			
	Our share of total receipts		41.55	

Expenses				
Police	$ 6.25			
Printing	2.50			
Official	5.00			
Car fares	.85			
Cleats	2.50			
		17.10		
Net Gain				24.45
11. Malden High (I.S.F.B.A.)				
Our share of total receipts		11.25		
Expences				
Police	$2.00			
Official	5.00			
Printing	1.00			
Barge	5.00			
Grounds	12.50			
		25.50		
Net Loss			14.25	
21. Dorchester High (I.S.F.B.A.)				
Our share of total receipts		11.37		
Expenses				
Police	$3.00			
Official	5.00			
Printing	1.50			
Barge	5.00			
Grounds	12.50			
		27.00		
Net Loss			15.63	
27. Somerville High (I.S.F.B.A.)				
Our share of total receipts		602.57		
Expences				
Police	$32.50			
Official	22 50			
Printing	12.00			
Barge	7.50			
Ticket Takers	5.00			
Foot Ball	2.25			
		81.75		
Net Gain				520.82
Balance		521.70		
		543.43		543.45
Total Net Gain from the Games				521.70

1902

Oct. 1. Balance on hand				16.59
Received from Graduate Subscriptions				8.00
Total Net Gain from Games				521 70
Supplies				
Nov. 1. Wright & Ditson	$13.78			
21. Iver Johnson Co.,	4.90			
26. J. F. Ryan	5.00			
Dec. 1. Wright & Ditson	13 84			
24. Iver Johnson Co.,	51.80			
		89.32		

Nov. 26.	Songs for Mass Meeting	$1.50		
	Foot Ball Coach	105.50		
	Total Manager's Expences	6.61		
Dec. 2.	Trian. League Dues	5.00		
5.	Stamps and Bill Book	1.20		
12.	Hockey Leagues Dues	5.00		
24.	R. M. T. S. Pin for Manager	3.00		
			127.81	
	Balance		329.16	
			546.29	546.29
1903.				
Jan. 1.	Balance on Hand			329.16

W. B. SPRAGUE,
Treasurer.

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R. M. T. S. Register

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Editorials.

The management have decided to publish an extra large number for June: — making it about twice as large as usual. Besides making it an augmented number, we have decided to introduce several new features, namely:— initial letters, tailpieces. etc; and as these things do not grow on bushes, we would like as many designs as possible:— the more the better. We also want some good stories, and any fellow who has or will write a good one will please hand it to the Editor.

The May "Radiator" is our only exchange this month.

Moving Sidewalks for New York.

At present there is a great need of some transit system in certain parts of New York, which may be established at a much lower cost than elevated or subway railways. This is especially needed at the Manhatten terminals to connect the three great bridges over the East River with one another, and also with the subway, surface and elevated lines, running north and south.

A new device has been contrived which is before the New York authorities for consideration; one which seems to answer the requirements very well. This system is known as "Underground Moving Sidewalks." Men like Cornelius Vanderbilt, E. P. Ripley and Stuyvesant Fish are much interested in the scheme, and the engineers pronounce it not only practicable but very economical.

The plan is to dig a subway from twenty-five to thirty feet wide and open stations at every two blocks. The continuous trains are simply flat platforms with seats on one side and a space on the other, so that one way hasten his speed by walking if he prefers. The train does not stop for passengers to get on or off, for stepping platforms are provided, running alongside the train platform. The passenger steps on one platform moving at the rate of three miles an hour, and then on another moving at six miles an hour, and then on the train moving at nine miles an hour. To get off he reverses his course. The platforms are regulated so simply that there will be little danger of accident, much less than when travelling on trolley or elevated cars. The seats are to hold four people and are to be three feet apart. It will require about 10,600 cars looped together, to make up the continuous train, and they will have a capacity of carrying 50,000 people at the rate of nine miles an hour. The subway or tunnel will be lighted and moderately heated in winter. Crowds will accumulate no more than on an ordinary sidewalk, for the reason that there will be no waiting for trains. The trains will be run by electricty and there will be no heavy locomotives which would require a heavier and stronger road bed. There will also be no housing of cars, which lessens the expense.

A similar method of transit was in operation at the Chicago and Paris Fairs which carried thousands of people comfortably and without accident.

A. W. Johnson, '04.

School and Class Notes.

"A SUBSTITUTE FOR THE LUNCH COUNTER."

Mr. Telfer has difficulty in keeping drinking glasses in the forge-shop.

It is due to the many boys who get hungry, (which is very foolish) and as a substitute for food, bite large pieces of glass from the tumblers endeavoring to get that filled feeling. Greedy fellows!

But they will soon have to find another substitute as a pattern is being made for a cast-iron cup.

Good luck to the new "frat."

1903.

NURSERY RHYME.

For a female bite
See old "Skeeter" White.

The musty odor in the Senior locker-room (which, by-the-way, is extensively used by Sophomores as a lounging place) is due to the many gallons of machine-shop soda water, which have been pumped into the jumper pockets of some of the sleepy Seniors.

The "Rabbi" and the "Ten-Penny Spike" are the best (?) men we've got.

Mr. Wood says that one of the Physics text-books is full of ether.

We wonder if that is the reason why one falls asleep so easily when one studies it.

Teacher in Physics :— "What is the thermal capacity of the human body."

Pupil :— "At what time of the year?"

Teacher :— "In the summer."

Pedlar (outside) :— Strawberries.

Same teacher :— "Water boils in a boiler at what temperature, Boyle?"

Boyle :— "I didn't understand."

Mr. Wood :— Shepard, you and (Ewen) Cook take readings."

Cutler (in geometry) :— The perpendicular from the perpendicular to the perpendicular at the perpendicular is perpendicular to the perpendicular at the perpendicular.

The fellows who intend to have, but have not yet had their pictures taken are requested to go early and avoid the usual "June rush."

Mr. Morse would like to know who the "little Washington School girl" is who attracts Dolloff's attention on Thursday mornings.

At a meeting of the class, held Friday afternoon, May 22, a committee of three was appointed to arrange for a class supper, to be held on Monday evening, June 15. The committee is composed of Stewart, Boyson, and Hanlon.

The report of the manager of the drama was read and excepted.

1904.

NURSERY RHYMES.

My name is Teddy,
And I'm always ready.

Shine! shine! who wants a shine!

The Bishop, the Baker,
And the candle-stick maker.

Recently one of the members of this class noticed a book in the public library named "Dog Stories and Dog Lore." He suggested that instead of having K-163 for its number K-9 would be more appropriate.

For a limited time Prof. Ames will give exhibitions of Belt-Jumping in the Machine Shop.

"I had it right but I didn't know whether it was right or not." This is one of Foster's many witty sayings.

"Beware of the dogs." '04's Machine Shop maxim.

"Mr. Smyth" (Long "y.")

"Mr." Roger Hubbard announced in class not long ago that he was "in love." When is it, Roger?

Congratulations "Lonny."

Louis Wruck has left school.

Freshman days are returning to the

College Division, or it seemed so to Sayre when he found himself chewing grass.

It has been remarked that Batchelder hasn't sense enough to keep his head out of "pane."

1905.

Company "C" of the Eighth Regiment, M. V. M., has quite a quota of R. M. T. S. and C. M. T. S. men in its ranks.

Five of the latter are non-comissioned officers and several of the former are privates. Preble and Rosenberg of this class are among the most recent enrolled on the books.

Ask Marshall if he plays ping-pong.

A Freshman and Sophomore had had a disagreement, in which the Freshman got the worst. A few minutes later the latter and one of his classmates were talking it over. Freshman Number 2 said to Freshman Number 1, "If a fellow said that to me I would call him a liar." Freshman Number 1 answered:---

"That is a good idea; do you know where the telephone is in this room?"

1906.

"Where, oh where, did you get those socks?" is a frequent song of this class.

"I wish I had studied more on English History" is now the cry of several of the fellows.

"Willie" Boyd, the feather-weight champion is to fight "Bocky" Barnard, the heavy-weight, for the championship of division "A."

"Bunny" Abbot has a very loud vest. Bunny was always a good in-"vest"-or.

The Automobile.

The question of the horseless carriage has become, in the past five years, one of international interest. Automobiles are divided into three classes with regard to motive power, namely, steam, gasoline, and electric. The uses to which automobles are subjected may also be considered under three divisions, namely, speeding, pleasure and commercial purposes. They differ largely in size, from the street-roller to the small motor-cycle. The best way to consider the auto is by making comparisons between the different kinds.

The steam carriage for reliability is at present, recognized as the standard vehicle. This style auto is driven by an engine, which is, in principle, the same as the big slide-valve engine used in factories. The steam is generated in a cylindrical boiler, the most common being of the five-tube type. There are square water-tube boilers in use, but they are very scarce in proportion to the round style. The water is heated in the boiler, by means of a burner to which the gasoline is fed under a pressure ranging from forty to eighty pounds. The sprocket on the engine is connected to the sprocket on the driving axle, rear, by means of a chain, thus dispensing with the transmission gear, a source of great annoyance on the gasoline car. In the new style Stanley carriages, horizontal engines are being used, and instead of a chain, the driving rod of the engine is connected directly to the driving axle. On the steamer the speed is regulated by a forward or backward movement of the

throttle lever. where, on the gasoline auto it is necessary to shift gears to change the speeds. The modern steam automobile is so constructed that there is practically no danger of an accident. There are pumps connected to the engine which keep everything to a certain pressure, adjustable to suit the operator. When the steam in the boiler reaches safety point, the surplus is immediately blown off by means of an automatic pop safety valve. Again, when the steam is high enough, the fire is automatically turned down and immediately springs up again when the pressure has diminished. The water in the boiler is kept at a uniform height, the supply being drawn from a tank, usually carried in the rear of the body. If a leak should occur, instead of exploding the gasoline would burn off the tank in a yellow smoky flame. One can easily see that the chance for an accident is exceedingly small. For climbing hills the steam carriage is second to none. The freedom from vibration and noise are excellent points in its favor.

The gasoline automobile comes next to the steamer in nearly every respect. The principal parts of the gasoline motor are the cyclinder, piston, connecting-rod, crank-shaft and carburetter. It works as follows: the out stroke of the piston makes a vacuum in the cylinder which lifts up the inlet valve to let in a charge of hydrocarbon or mechanical gas; the return stroke compresses this gas to about four atmospheres, and when at the proper point of compression, an electric spark ignites the gas, making an explosion which throws the piston forward on the working stroke. At the end of this stroke, the motion of the balance wheel carries the piston back, and, the exhaust valve having been opened by cam action, forces the burned gases in the open air or muffler. This gas is the result of a system of aspiration and vaporization through what is called the carburetter. The suction of the piston draws gasoline and air through properly proportioned valves and the mixture is hydrocarbon gas. The great number of explosions per minute make the cylinder very hot, so, to prevent an explosion of the cylinder, it is kept cool by a constant circulation of water, regulated by a pump connected with the engine. This water runs between the cylinder proper and a jacket around the outside. Some of the small motors are air cooled. The electric spark is obtained from dry cells in connection with an induction coil. An explosive engine or motor, is one driven in the above way. The motor, unlike the steam engine, runs when the carriage is standing still, a friction clutch being employed to shift the power to the driving axle. The motor has to be started by means of a crank. The great objections to the gasoline carriage are the noise and odor it makes.

The unpopularity of the electric carriage is due to the inability to carry a sufficient amount of power for a long run. Storage batteries furnish the power, but it is necessary to charge these quite often, the capacity of power of course ranging in proportion to the number of cells carried, but these are so heavy that not many can be carried at a time. If some storage battery could be invented that would hold the power for long hilly runs, the electric carriage would be king of the horseless age, there being no complications in the running parts like there are in

steam and gasoline automobiles. There is really nothing in the electric auto but the motor and batteries. Mr. Edison has a battery in course of construction which is expected to revolutionize the life of the electric carriage. This style auto is undoubtedly the best for pleasure purposes, but for speeding, the gasoline car seems to hold public favor.

For commercial purposes the electric auto has so far proved its superiority. As most commercial autos are used in the city it is easy to keep the batteries charged because in sections where most of the work is done, charging stations have been erected. The ease of control makes the electric the favorite among business men.

Taken as a whole the automobile may be said to have revolutionized every phase of life in the civilized world, and mans' best friend, the horse is slowly but surely becoming a back number.

William C. Glass, '04.

Annual Reunion, C. M. T. S. '95.

The same old crowd of '95 fellows journeyed to the United States Hotel, on May 12th, there to hold their ninth annual dinner and meeting.

The number present was very satisfactory, after eight years out of school, and considering the inroads Dan Cupid has made of late among the fellows.

Brother Hickey's good things to eat were disposed of in the manner taught at the old school, and it was quite evident the boys had not forgotten all they had learned many years ago.

At the business meeting, which was the longest and jolliest held for some years, the president "Slugger" of olden times, put his foot into it by mentioning the constitution, which has been peacefully reposing on the table for several years past. After the worthy president had been again set on his feet the class elected as officers for the ensuing year, President, Jeremiah F. Downey; Vice-President, Harry Foss; Secretary and Treasurer, William F. Haverty.

Thereafter a good time in general including the reading of a "same as usual" letter from Dakin in Chicago, full of good advice, based on the old proverb á la Dakin, "A rolling stone is worth two in the bush." Adjourned at eleven P. M. with a rousing C. M. T. S. for '95, and still on good terms with the hotel management.

E. A. O.

A thing that will be of interest to the graduates of the school as well as the present students in the school, is the founding of the new fraternity, Epsilon Alpha Omicron. The society was first started on March 6, '03, under the name of Delta Tau Sigma, which was later changed to the present name. The fraternity was started with six members, namely: Fletcher, Beckett, and Hanlon of 1903, Crosby and Smyth of 1904, and Woodcock of 1905.

These drew up the constitution and by-laws and got the fraternity into running order.

The object of the society is to better

athletics in R. M. T. S. and to further this object athletes and prominent fellows in school are needed.

Our first new members were Cleveland and Brooks, 1903, Bishop, 1904, and Park. 1906, who were admitted March 27, 1903 and these four have proven valuable members.

On April 24, Hicks, 1904, was admitted mid the general hurrahs and yells of his fellow-members. (Kind of tough wasn't it, Bert?) The fraternity has at present four applicants doing "stunts" in school, but whom we hope to see soon wearing our pins as full fledged members.

The society is glad and honored to say that it has two of the most prominent men in school as Honorary Members:---Mr. Morse, our head master, and Mr. Hill are the two gentlemen and, as before stated, the society feels honored to be able to have their names among its members.

We will be glad to receive suggestions from any of the graduates and we feel at present as if we are going to become a powerful and honored institution in our School.

J. A. S. Smyth, Sec'y.

An Incident of the Spanish War.

Lieutenant Fisher of the 71st N. Y., together with three or four troopers of the famous "colored cavalry;" were engaged, shortly after the grand charge at San Juan Hill, in carrying water from a little stream to the hospital tents of the American Army.

The Spaniards had been driven out of their fortifications but there were many stragglers who had escaped the general rout, and were giving a great deal of trouble to the outposts of our army.

The Lieutenant and his men noticed that there was a constant succession of shots coming from the same spot on the bank of a stream, and on returning from one of their trips, loaded with buckets of water, they learned that the "overflow men," or the wounded soldiers who could not be cared for in the temporary hospital-tents, but were laying on cots outside, were being "picked off," as they lay helpless, by someone in ambush.

The Lieutenant and his men immediately started off for the place where they had noticed the firing, and soon located the wretch, who would fire on wounded men under the red-cross flag. He was perched in the top of a tree, and was liesurely "picking off" the poor fellows as they lay suffering under the tropical sun. He was covered by the carbines of the troopers, and forced to descend the tree, the cavalrymen refusing to shoot him, in spite of the officer's orders.

Their purpose was soon apparent, however, for, no sooner had the Spaniard come within reach of their sabres, than the infuriated Tennesseans literally ripped him to pieces.

H. R. S., '03.

Base Ball Games.

R. M. T. S. *vs.* NEWTON.

On May 1, R. M. T. S. beat Newton High to the tune of 8 to 5. Our fellows played a good game and gave Beckett very good support. Beckett struck out fifteen men. The score:—

R. M. T. S.

	ab	r	bh	tb	po	a	e
Boyson cf	3	2	0	0	1	0	1
Hamilton 3b	4	1	2	2	1	1	2
Hannum rf	4	1	2	2	0	0	1
McCrehan 1b	5	2	2	3	8	1	1
Park c	5	1	1	1	15	3	0
Cleveland lf	5	1	1	1	0	0	0
Fiske ss	5	0	1	1	0	3	1
White 2b	3	0	0	0	1	0	0
Beckett p	1	0	0	0	0	1	0
Totals	35	8	9	10	26	9	6

NEWTON.

	ab	r	bh	tb	po	a	e
Leonard ss	5	2	2	2	1	1	2
Bacon 2b	5	1	1	1	2	1	0
Newall p	2	2	1	1	0	7	0
Stephenson 1b	5	0	1	2	9	1	3
Shaw c	4	0	0	0	9	0	0
Haskell rf	3	0	0	0	0	0	0
Thomas 3b	4	0	1	1	0	0	1
Woodward cf	3	0	0	0	3	1	0
Johnson lf	4	0	0	0	0	0	1
Young cf	1	0	0	0	3	0	0
Totals	36	5	6	7	27	11	7

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	3	0	0	0	0	0	5	0		—8
Newton	1	0	2	0	0	0	2	0	0	—5

Two base hits, McCrehan, Stephenson. Sacrifice hits, Boyson. Stolen bases, Boyson, Hamilton, Hannum 2, McCrehan, Park, Leonard 3, Bacon, Newall 2, Stephenson. First Base on Balls, Beckett 4, Newall 4. Struck out, Beckett 15, Newall 9. Double play, Woodward to Stephenson. Umpires, Clark and Holt. Time, 1h 45m.

R. M. T. S. *vs.* MALDEN HIGH.

Our first league game was played with Malden on Cambridge Common, May 5; the game was rather exciting in some places, but in others the home team got into some nasty holes, but thanks to Hannum's pitching, it managed to pull out ahead. Cate pitched a strong game. The score:—

R. M. T. S.

	bh	po	a	e
Boyson cf, ss	3	2	2	2
Hamilton 3b	0	1	0	1
Hannum p	1	1	3	0
McCrehan 1b	1	8	2	1
Parks c	2	11	4	0
Cleveland lf	2	1	0	0
Fiske ss	0	0	0	0
Beckett rf	0	0	0	0
Slocum rf	0	1	0	0
White 2b	1	2	3	4
Totals	10	27	14	8

MALDEN H. S.

	bh	po	a	e
Whittier 3b	0	1	0	0
Connelly ss	1	0	2	1
White cf	2	0	0	0
Macurda 1b	3	10	0	0
Carter lf	1	2	0	0
Frederickson rf	1	0	0	2
Babcock rf	0	1	0	0
Morton c	0	10	0	0
Cate p	0	0	1	0
Butterman 3b	0	0	3	1
Totals	8	24	6	4

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	2	0	1	1	0	1	5	0		—10
Malden H. S.	4	1	0	0	0	0	0	0	2	— 7

Runs made, by Boyson 3, Hamilton, McCrehan, Parks 2, Cleveland, Slocum, White, Whittier, White 2, Macurda, Babcock, Frederickson, Butterman. Two-base hits, Boyson 2, Parks, Macurda, Frederickson, Hannum. Stolen bases, R. M. T. S. 7. Base on balls, off Hannum 4, off Carter 2. Struck out by Hannum 11, by Cate 9. Sacrifice hits, Beckett, Hamilton, Slocum. Double

play, Butterman to Whitten. Wild pitch, Cate. Passed balls, Parke, Morton. Umpire, Sane. Time, 2h 35m. Attenance 500.

R. M. T. S. *vs.* WAKEFIELD.

Our next game was played with Wakefield at Wakefield. Our team played an almost perfect fielding game and batted strongly. The score:—

R. M. T. S.

	ab	r	bh	tb	po	a	e
Boyson (capt) cf	3	4	1	1	2	0	0
Hamilton 3b	5	4	4	6	1	3	1
Hannum ss	6	4	3	3	7	1	0
McCrehan 1b	6	3	2	2	4	0	0
Park c	5	3	2	4	11	0	0
Cleveland lf	4	1	1	1	0	0	0
Slocomb rf	4	1	1	2	0	0	0
Beckett p	5	1	4	5	1	2	0
White 2b	4	3	0	0	0	1	0
Fiske 2b	2	0	0	0	1	0	0
Totals	44	24	17	24	27	7	1

WAKEFIELD.

	ab	r	bh	tb	po	a	e
Holland(capt)2b	3	0	2	2	3	1	1
Shichy lf	4	0	0	0	0	0	0
Stout 3b	4	0	0	0	0	1	1
Casey c	4	0	0	0	5	2	2
Jordan 1b	4	0	1	1	12	1	0
Harrington ss p	4	0	2	2	2	6	1
Maloney cf	4	0	0	0	3	0	1
Whitney p rf	4	0	0	0	0	1	1
Gooch rf ss	3	0	1	1	2	1	2
Totals	34	0	6	6	27	13	9

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	0	1	4	5	6	4	1	3	0	—24
Wakefield	0	0	0	0	0	0	0	0	0	— 0

Two base hits, Hamilton 2, Slocum, Beckett. Three base hits, Park, Beckett. Sacrifice hit, Slocomb. Stolen bases, Boyson 2, Hamilton, Park, Hannum, McCrehan 2, Cleveland, White. First base on balls, by Whitney and Harrington 7, by Beckett 1. Struck out, by Whitney and Harrington 4, by Beckett 10. Hit by pitched ball, Park 2, Slocomb. Umpires, Ward and Edwards. Time, 2h.

R. M. T. S. *vs.* CAMBRIDGE HIGH.

The first triangular league game was played, May 12, with Cambridge High School. Hanlon kept the hits scattered pretty well, with the exception of the first inning. Hannum pitched well after he went in. The score:—

R. M. T. S.

	ab	r	bh	tb	po	a	e
Boyson cf	3	2	0	0	0	0	0
Hamilton 3b	5	2	2	3	0	3	0
Hannum ss p	5	0	0	0	1	1	2
McCrehan 1b	5	2	3	5	15	1	2
Park c	5	1	3	4	9	0	1
Cleveland lf	2	0	0	0	0	0	0
Fiske 2b ss	4	0	1	1	0	4	2
Slocomb rf	3	0	0	0	1	0	1
Hanlon p	3	1	0	0	0	2	0
White 2b	1	0	0	0	0	0	0
Totals,	36	8	9	13	26	10	8

CAMBRIDGE HIGH.

	ab	r	bh	tb	po	a	e
Church 3b	5	0	1	1	3	4	3
Taylor 1b	5	0	1	1	13	0	2
Grebanstein p	5	1	2	2	0	3	2
Davis c	5	1	1	1	4	1	0
L'Estrange 2b	3	1	0	0	1	1	1
Stead ss	4	1	1	2	0	2	1
Pierce cf	4	0	0	0	2	1	0
McDonald lf 2b	2	0	0	0	2	0	0
Bachelor rf	3	0	0	0	2	0	0
Cunningham lf	0	0	0	0	0	0	0
Totals	36	4	6	7	27	12	9

Two base hits, McCrehan 2, Park, Hamilton, Stead. Stolen bases, Boyson 3, Hamilton 2, McCrehan, Park 2, Cleveland 2, Hanlon 2. Struck out, by Grebenstein 4, by Hanlon and Hannum 9. Hit by pitched ball, Boyson, Cleveland, L'Estrange, McDonald. Hit by batted ball, Stead. Umpire, Sullivan. Attendance 500.

R. M. T. S. *vs.* SOMERVILLE.

On May 16, R. M. T. S., was defeated for the second time by Somerville

High by the score of 15 to 3. With three of our players sick it is remarkable that Somerville did not beat us worse than they did as the three players are among the strongest batters we have. In spite of the poor support that Beckett received, he pitched a steady game although he was batted hard at times. He struck out 9 men. The score: —

R. M. T. S.

	ab	r	bh	tb	po	a	e
Boyson cf	5	0	2	2	0	0	3
Hamilton 3b	4	2	1	3	0	2	1
Hannum ss	3	1	0	0	1	4	3
McCrehan 1b	3	0	0	0	9	0	0
Park c	3	0	1	3	13	1	1
Cleveland lf	4	0	1	1	0	0	0
Slocomb rf	3	0	0	0	0	0	1
Beckett p	4	0	1	1	0	1	0
White 2b	3	0	0	0	4	2	0
Fiske*	1	0	0	0	0	0	0
Totals	33	3	6	10	27	10	9

*Batted for Soclomb in ninth.

SOMERVILLE.

	ab	r	bh	tb	po	a	e
Blair 1b	6	3	2	3	7	7	1
Mulloney ss	5	2	1	1	2	0	0
Hafford p	6	2	1	1	0	2	1
Tift lf	6	1	3	4	4	0	0
Dickinson 2b	4	1	2	3	1	3	1
Cuddy 3b	6	2	3	3	0	2	0
Hodgdon cf	6	1	2	2	2	0	0
Dougherty rf	5	0	1	1	0	0	0
Good c	4	3	1	1	11	1	2
Totals	48	15	16	19	27	10	5

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	2	0	0	0	0	0	0	1	0	— 3
Somerville	4	3	1	2	0	0	3	2	0	—15

Three base hits, Hamilton, Park, Dickinson. Two base hits, Tift, Blair Sacrifice hits, McCrehan, Park. Stolen bases, Hamilton, Hannum, Blair, Mulloney, Hafford 2, Tift, Good 2. First base on balls, by Beckett 3, by Hafford 3. Hit by pitched ball, Dickinson. Struck out, by Beckett 9, by Hafford 10. Umpires, Hamill and Buckman. Time 2h 45m. Attendance 900.

R. M. T. S. *vs.* CAMBRIDGE LATIN.

R. M. T. S. won the championship of the Cambridge Triangular League May 19 by defeating Cambridge Latin by a score of 19 1. Every man of our team was able to hit Brennan, who by the way was not in his best form. Beckett did the best hitting, making six hits in six times at the bat. McCrehan was not able to play on account of sickness. The score: —

R. M. T. S.

	ab	r	bh	tb	po	a	e
Boyson cf	5	1	3	4	0	0	0
Hamilton 3b	7	3	4	6	6	0	2
Hannum p	6	2	2	2	0	4	1
Beckett 1b	6	5	6	7	11	0	0
Park c	6	2	5	6	7	1	1
Cleveland cf	4	1	1	3	0	0	0
Fiske ss	5	1	1	2	1	1	0
Slocomb rf	6	2	3	5	0	0	0
White 2b	6	2	1	1	2	2	1
Totals,	51	19	26	36	27	8	5

C. L. S.

	ab	r	bh	tb	po	a	e
Conlin c	5	0	0	0	3	1	0
Murphy rf	5	0	2	0	0	0	0
Ellis 1b	4	0	0	0	16	0	3
Brennan p	5	0	1	0	1	3	0
McCarthy lf	4	0	1	0	1	0	0
Burton 2b	3	0	0	0	3	1	3
Carr ss	3	0	0	0	1	3	3
Paine 3b	2	0	0	0	1	1	0
Chase cf	4	1	1	0	1	1	0
Totals	35	1	5	0	27	10	9

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	2	8	2	4	1	2	0	0	0	—19
C. L. S.	0	0	0	0	0	0	0	0	1	— 1

Two base hits, Boyson, Hamilton, Beckett, Park, Cleveland, Fiske, Slocomb. Sacrifice hit, White. Stolen bases, Boyson, Hannum, Beckett 2, Park 2, Fiske, White. First base on balls, by Brennan 4, by Hannum 4. Hit by pitched ball, Ellis. Struck out, by Hannum 7, by Brennan 3. Umpires, Roper aud Sullivan. Time 2h.

R. M. T. S. *vs.* DORCHESTER.

The Rindge Manual Training School took the Dorchester High nine into camp on the latter's grounds after a well-played and exciting contest in the Interscholastic league series, the score being 8—6. Both teams started off to

win and in the first scored a couple of runs each. Dorchester High also crossed another man in the next inning and Rindge made three in the third. Hickey in the fifth cracked out a three-bagger and Vinal brought him home on a single.

In the eighth and ninth the training school boys went into the game hard and two more of them came home, aided by errors and a couple of hits. The home team was easily retired in their final turn at the bat.

For Rindge, Beckett pitched well and allowed hls opponents only five hits, while Barnstead of Dorchester was touched up for 12 by the winners, Boyson and Cleveland excelled at the bat for the Rindge nine and connected safely three times. Hickey at third base did some good work and was the heavy hitter for the home team. Vinal and Haynes also played well. The score:—

R. M. T. S.

	bh	po	a	e
Boyson cf,	3	3	0	0
Hamilton 3b	1	1	1	0
Hannum 1b	2	10	0	0
Parks c	2	9	1	0
Beckett p	0	0	4	1
Cleveland lf	3	2	0	0
Fiske ss	1	0	3	3
Slocomb rf	0	0	0	0
White 3b	0	2	0	0
Totals	12	27	9	5

DORCHESTER HIGH.

	bh	po	a	e
Hapgood ss	0	1	3	0
Holt 2b	0	5	2	2
Bailey 1b	1	6	0	2
Hickey 3b	2	0	2	1
Barnstead p	0	0	0	1
Vinal c	1	11	2	0
Sullivan rf	0	0	0	0
Tarbox lf	0	1	0	0
Haynes cf	1	3	0	0
Totals	5	27	9	6

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	2	0	3	0	0	0	0	2	1	—8
Dorchester	2	1	0	0	3	0	0	0	0	—6

Runs made by Park, Beckett, Cleveland, Hamilton 2, Hannum 3, Hapgood, Holt, Bailey, Hickey, Vinal, Tarbox. Two-base hit, Hickey. Three-base hit, Cleveland. Stolen bases, Boyson 3, Hamilton 3, Hannum 2, Hapgood, Vinal 2, Haynes. Bases on balls, off Barnstead: Boyson, Hannum, Park, Cleveland; off Beckett: Barnstead, Haynes. Struck out, by Beckett 8, by Barnstead 10. Double play, Beckett to Park to Hannum. Umpire, Mitchell. Time 2h. Attendance 700.

R. M. T. S. *vs.* CUSHING ACADEMY.

Rindge Manual Training School's base ball team was beaten in a 1 to 0 game at Ashburnham, May 27, by Cushing Academy, and the Cambridge men charge their defeat to the umpire. The game was a pitchers' battle, in which Richardson and Hannum did good good work on the firing line. The score: —

R. M. T. S.

	ab	r	bh	tb	po	a	e
Boyson cf	4	0	0	0	0	0	0
Hamilton 3b	4	0	2	2	2	1	0
Hannum p	4	0	1	1	1	3	0
Park c	3	0	2	3	9	0	0
Beckett 1b	3	0	0	0	8	2	1
Cleveland lf	3	0	0	0	1	0	0
Fiske ss	3	0	0	0	2	0	2
White 2b	3	0	0	0	4	1	1
Slocomb rf	3	0	0	0	0	0	0
Totals	30	0	5	6	27	7	4

CUSHING ACADEMY.

	ab	r	bh	tb	po	a	e
Martin 2b	4	0	0	0	1	0	0
Carr lf	4	0	0	2	1	0	0
Paquet 3b	4	1	2	1	2	0	0
Richardson p	3	0	1	0	2	2	0
Lang rf	3	0	0	1	3	0	0
Adams 1b	3	0	1	0	4	0	1
Balcom c	3	0	0	0	9	0	0
Potter cf	3	0	0	0	1	0	0
Heald ss	3	0	0	0	1	0	0
Totals	30	1	4	4	24	2	1

Innings	1	2	3	4	5	6	7	8	9	
Cushing A	0	0	0	1	0	0	0	0	0	—1

Two base hit, Park. Stolen baaes, Martin, Hamilton. Passed balls, Park, 3. Wild pitch, Hannum. Struck out, by Richardson 13, by Hannum 9. Umpire, Pruyne. Time 1h 20m. Attendance 400.

R. M. T. S. *vs.* ENGLISH HIGH.

Rindge Manual Training School easily defeated Boston English High School, Memorial Day morning at the South End gronnds, 10—1, in the interscholastic league series. Burke was hit for 13, and on these and clever base running the Cambridge school won out. English High made its only run in the first on a base hit and an error. The score: —

R. M. T. S.

	bh	po	a	e
Boyson cf	2	1	0	0
Hamilton 3b	1	6	2	0
Hannum ss	1	2	4	0
Park c	2	8	0	0
McCrehan 1b	1	6	0	1
Cleveland lf	1	1	0	1
Beckett p	2	0	2	0
White 2b	2	2	0	0
Slocomb rf	1	1	0	0
Totals,	13	27	8	2

ENGLISH HIGH SCHOOL.

	bh	po	a	e
Cole lf	0	3	0	0
Hamburger c	2	3	0	1
Clapp 3b	0	5	1	1
Burke p	1	0	0	0
Briggs ss	1	5	2	1
Brannan cf	0	1	0	0
Wolff 1b	0	3	0	0
Slater rf	0	0	0	0
Ryan 2b	0	4	1	1
Totals	4	24	4	4

Innings	1	2	3	4	5	6	7	8	9	
R. M. T. S.	0	3	0	2	0	1	0	4		—10
B. E. H. S.	1	0	0	0	0	0	0	0	0	— 1

Runs made, by Boyson, McCrehan, Cleveland 2, Beckett 3, White 3, Hamburger. Stolen bases, Boyson 2, Hannum. Bases on balls, off Burke 5, off Beckett. Struck out, by Beckett 7, by Burke. Umpire, Duffy. Time 1h 30m. Attendance 300.

Interscholastic League Standing.

Somerville High	5	1	.833
Rindge Manual Training	3	1	.750
Dorchester High	3	3	.500
English High	2	4	.333
Malden High	1	4	.200

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Editorials.

This being the last issue of the REGISTER, perhaps a few words of thanks to the fellows who have supported the paper would not be out of the way.

The retiring Board of Editors is greatly indebted to the few fellows who have done anything for the paper, and hope the coming Board for next year be supported by the whole school.

"Usonian" of Malden is our only exchange this month.

ORDER OF

GRADUATION EXERCISES.

Music

Exercise: The United States Weather Bureau

1. History — Eugene C. Brooks
2. Work — James A. Longley
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(Highest Class Honors belong to Walter K. Cabot)

Music

Award of Diplomas — His Honor, the Mayor

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The History of the United States Weather Bureau.

It has usually been the plan of the senior classes of the Rindge Manual Training School to choose, for the graduating exercises, a subject which would be connected with their work in school and at the same time be of general interest. Following this precedent we have chosen for our subject the work of the United States Weather Bureau.

The work of the bureau is based upon the laws of Meteorology, or in simpler words, the science of the weather; and this subject, which was an interesting part of our class work, should be of interest to all those who undergo the varied conditions of this New England climate.

The history of the United States Weather Service as a national institution dates back only 33 years, but many investigations into the weather had been made previous to that time.

The first hint we get of the fact that the weather follows any well defined laws is from Benjamin Franklin, a scientist as well as statesman, diplomat, and patriot. He had arranged with a friend in Boston to take observations of an eclipse; but a storm prevented Franklin, at Philadelphia, from securing his observations. As the wind came from the direction of Boston, Franklin supposed the storm to have come from there, but his friend sent him word that the storm had not reached Boston until the next day.

The direction of the wind and the lateness of arrival of the storm at Boston lead Franklin to the discovery of the rotary motion of storms and their habit of travelling across the country.

Thomas Jefferson, another weather student, as well as statesman, kept a careful record of temperature and air pressure. His thermometer reading, taken on the 4th of July, 1776, shows that, contrary to the statements of some historians, Philadelphia was undergoing cool weather on that momentous day. Jefferson and a friend named Madison, took simultaneous weather observations until the British ransacked Madisons' house and carried away his barometer.

However, the invention of the electric telegraph really commenced our modern weather service. Almost immediately thereafter came the idea of taking simultaneous observations upon the weather throughout the country and with them of constructing charts for careful study. With these charts the laws governing the weather could be studied and forecasts of weather changes could be made with some accuracy.

This increase of interest prepared the way for a scientific treatment of the whole subject, and to William Ferrel, a self-taught mathematician and astronomer of North Carolina, belongs the honor of making the first scientific statement of laws governing the weather.

The Civil war caused a break in the progress of the science but after its end, Professor Lapham, a forecaster of some renown on the Great Lakes, interested a member of Congress in his work in the hope of reducing the great maritime losses on those bodies of water.

This congressman proposed the bill which, when passed created the United

States Weather Service. The bill required the Secretary of War to have simultaneous weather observations taken at the military stations throughout the country, and to give notice of approaching storms to farmers and mariners. The direction of this work devolved upon General Myer, the chief signal officer of the army and he introduced nearly all of the methods of operation now employed by the service.

Although American scientists first discovered the progressive character of storms and first showed the value of government forecasting the United States was only the fourth nation to start a weather service; France, England and Holland being the pioneers in that respect.

After ten years of energetic service, General Myer died and General Hazen became chief. He appointed a body of civilians to help him in his work and also entered into a scheme to explore the atmosphere of the Arctic zone. This exploration served to make famous the next leader, General Greely; it was through Greely's efforts, when chief, that the service was finally transferred to the Department of Agriculture.

The officers for the new service, now called the United States Weather Bureau, were to be chosen from both civilian weather students and from former military forecasters, but at the outbreak of the Spanish-American war provision was made so that the Bureau would be wholly independent of the Army.

Professor Harrington, the first leader of the new department, re-organized the service and increased the number of weather stations.

Eight years ago Professor Willis L. Moore was appointed as chief of the weather bureau and he has been dealing out the weather impartially ever since.

He has made some great improvements in the work and has caused several important investigations to be made into such subjects as the magnetic relation of the sun and the earth and the conditions of the upper and the lower atmosphere.

Thus the United States weather service has advanced from obscurity to an important and expensive part of the government, costing over $1,000,000 annually, and Professor Moore now heads the best equipped and most efficient weather service in the world, in fact it is said on good authority, that it would require an international service embracing all the countries of Europe to equal ours in extent and in accuracy of its forecasts.

EUGENE. C. BROOKS.

Value and Extent of United States Weather Bureau.

WE have just learned from the history of the United States Weather Bureau that the appropriations for maintaining this service amount to about $1,000,000 annually, and the question which I will now try to answer is: Do the farmer, the mariner and the manufacturer receive an adequate return for this large amount of money?

Let us first see how some of the appropriation is expended. There are, under the control of the government, about 180 regular observing stations, with paid attendants, with instruments

for taking observations. Each station sends out emergency warnings for an area extending about 100 miles in all directions. Besides these, daily forecasts and weather maps are issued from a central station in each state.

In addition, there are over 250 storm display stations on the Atlantic, Pacific and Gulf coasts and the shores of the Great Lakes, and about 200 river and rainfall observing stations located on the water-sheds and banks of the large rivers throughout the country. There are also about 1000 unpaid volunteers who serve the government by reporting the climatical conditions of their locality, and the material they furnish, in connection with the information derived from numerous other sources, is condensed into the crop reports.

The area covered by these trained observers embrace the whole of the United States, and, by a system of exchange, reports are received from nearly all of those inhabited portions of North America outside the limits of the United States.

The reports of these stations portray, twice daily, the climatical conditions of the country to the eye of the meteorological expert. The development of hurricanes, hot-waves, cold-waves and rainstorms, since the last report, is carefully watched and it is possible to forecast their future course and intensity quite accurately.

The phase in which the Weather Bureau is best known to most people is in the daily forecasts which appear in the newspapers, and the efficiency of the service is judged, not always fairly, by the accuracy of these reports.

The general public, although it gives the work of the Weather Bureau this low estimate, receives many benefits from the service. One of the most common of them is the maintainance of traffic on the railways which they so widely patronize.

When the reports indicate to the forecaster at a central statfon that we shall have a snow-storm that might interrupt travel on these roads, they send out notices to that effect. The managers of the roads can prepare for the snow, and thus can carry out the work of keeping their roadbeds clear through many storms that would otherwise demoralize the entire system.

The greatest service of the Weather Bureau, however, is rendered to the mariner, and he receives the reports with almost implicit confidence. Its system is so perfect in this direction that the chief of the Weather Bureau or the forecaster on duty at a central station can predict a storm, and feel certain that, within one or two hours, almost every vessel master whom he thinks will be affected, will receive a warning to that effect.

The advantages of such a system are at once apparent; the storm warnings can be displayed at practically every harbor on the coasts of the United States, and the forecasts are so accurate that not a storm of marked violence has occurred for years of which warnings have not been sent out at least twelve hours in advance.

The reports from the West Indies are especially valuable, as it is there that most of those destructive storms that sweep the Gulf and North Atlantic Coasts form. The time of sailing of the larger number of craft that leave our harbors is often changed by the warnings made from these reports; and

those displayed for the West Indian Hurricanes alone save annually millions of dollars worth of shipping.

A result of the neglect of one of these warnings is still fresh in our minds, in the loss of the Steamer Portland in 1898. Had the storm warning been heeded, the hundred lives would not have been sacrificed.

The warnings of cold-waves are perhaps next in inportance. When one of these cold-waves developes in the northern plateau of the Rocky Mountains and threanens to sweep down on the agricultural centres, the stations ahead are ordered to take observations every few hours and report them to their central station. Then if the danger becomes imminent, each observatory becomes a distributing centre and sends warnings to all persons known to have perishable articles exposed.

Here again the system is almost perfect, and it is not uncommon for 100, 000 telegrams and messages to be distributed in an hour or two. The value of these warnings, issued at small expense, may be readily seen, for on one occasion property valued at $3,500,000, of the warnings caused the owners to protect it, where otherwise it would have been destroyed by the cold wave.

These warnings are also sent to the stock exchange, and in the larger buildings there are employees of the government whose duty it is to look after the receipt of those reports and post them in conspicuous places. Most of the wheat and grain brokers have such confidence in them that they have been known to produce great changes in prices.

The flood warnings are also of great value, and the system now employed on our large rivers has proved very efficient- The danger level of every large city is accurately determined and charted. Then if the river and rainfall observers find that a river is likely to exceed this height, warnings are sent out to residents of low districts and merchants who have perishable goods in their cellars.

An illustration of this efficiency was shown during the recent flood of the Mississippi. Throughout the whole district that was submerged the warnings preceded the flood by several days. And it has been estimated tnat there many million dollars worth of live stock and personal property moved to ahigher district and saved. There were also many lives saved as a result of these warnings.

The Weather Bureau publishes monthly and annually weather and crop reports, which are of great value to a large variety of people. They enable planters and manufacturers to select the localities most favorable for carrying on their particular industries, and tourists and invalids the places most suited for their health and pleasure.

The Bureau is being constantly made more efficient. Only recently, under the direction of Secretary Wilson, we have made arrangements with Europe and the Azores Islands for the receipt of reports which, in connection with our present extensive system, enable us to forecast the direction of the wind and its velocity for trans-atlantic steamers leaving any country for three days out.

Another new departure is the rural weather service, which was made possible by the installation of the new rural delivery Post Office system. This

service enables the Weather Bureau to meet more than half way the people who most need its warnings of cold and of hot-waves, of frost, and of rain-storms. The latest forecasts are printed on small cardboard slips, and each mail carrier is given one for each house on his route; these he distributes daily with the mail.

Thus it may be seen that the Weather Bureau is finding its way into all the avenues that promise a sufficient return for the services it renders. And it has been estimated by experts of many callings that the meteorological service of the United States Government is worth over $20,000,000 annually to the industries of the country and all of us will, I think, agree that this is an adequate return for the $1,000,000 expended.

J. A. LONGLEY

Mark Twain's Speeeh on Weather.

You have thus far heard the stormy, scientific side of the weather story, but as there are always two sides to a story, would it not be well to hear what a less scientific authority has to say about weather, or rather New England weather in particular? Of course, you all konw what beautiful weather we have here in New England and what a large variety.

This is what Mark Twain says:

I reverently believe that the Maker who made us all, makes everything in New England but the weather. I don't know who makes that, but I think it must be raw apprentices in the weather clerk's factory, who experiment and learn how in New England for board and clothes, and then are promoted to make weather for countries that require a good article and will take their custom elsewhere if they don't get it. There is a sumptuous variety about the New England weather that compels the stranger's admiration—and regret. The weather is always doing something there; always attending strictly to business; always getting up new designs and trying them on the people to see how they will go. But it gets through more work in spring than in any other season. In the spring I have counted 136 different kinds of weather inside of 24 hours. It was I that made the fame and fortune of that man that had that marvellous collection of weather on exhibition at the centennial that so astounded the foreigners. He was going to travel all over the world and get specimens from all climes. I said, "Don't you do it. You come to New England on a favorable spring day." I told him what we could do in the way of style, variety and quantity. Well, he came and he made his collection in four days. As to variety, why, he confessed that he got hundreds of kinds of weather that he had never heard of before. And as to quantity—well, after he had picked out and discarded all that was blemished in any way, he not only had weather enough, but weather to spare, weather to hire out, weather to sell, to deposit; weather to invest, weather to give to the poor. The people of New England are by nature patient and forbearing but there are some things they will not stand. Every year they kill a lot of poets for writing about "Beautiful Spring." These are generally

casual visitors, who bring their notions of spring from somewhere else, and cannot of course know how the natives feel about spring. And so the first thing they know the opportunity to inquire how they feel has permanently gone by. Old "Probabilities" has a mighty reputation for accurate prophecy and thoroughly well deserves it. You take up the daily paper and observe how crisply and confidently he checks off what today's weather is going to be on the Pacific, down South, in the Middle States, in the Wisconsin region. See him sail along in the joy and pride of his powers until he gets to New England, and then see his tail drop. He doesn't know what the weather is going to be in New England. Well, he mulls over it and by and by he gets out something like this:

Probable northeast to southeast winds varying to the southward and westward and eastward, and points between high and low barometer, swapping around from place to place; probable areas of rain, snow, hail and drought, succeeded or preceeded by earthquakes, with thunder and lightning. Then he jots down this postscript from his wandering mind to cover accidents. "But it is possible that the programme may be wholly changed in the meantime."

Yes, one of the brightest gems of New England weather is the uncertainty of it. There is only one thing certain about it. You are certain there is going to be plenty of it—a perfect grand review; but you never can tell which end of the procession is coming first. You fix up for the drought; you leave your umbrella in the house and sally out, and two to one you get drowned. You make up your mind that the earthquake is due; you stand from under and take hold of something to steady yourself, and the first thing you know you get struck by lightning. These are great disappointments, but they can't be helped.

I could speak volumes about the inhuman perversity of the New England weather, but I will give but a single specimen. I like to hear it rain on a tin roof. So I covered my roof with tin with an eye to that luxury. Well, sir, do you think it ever rained on that tin? No, sir, skips it every time. Mind, in this speech I have been trying merely to do honor to the New England weather—no language could do it justice.

HOWARD R. SHAW.

Forecasting.

WE have just learned of the value of the work done by the Weather Bureau, let us now see how it obtains its information and what rules it follows in making the forecasts.

First let us think a moment of the nature of air, the element with which the bureau has to deal.

At some period before the creation of man, it is supposed that the earth was surrounded by very dense incandescent gases. As these gases gradually cooled, the more solid part solidified and formed the hard crust of the earth, while the more vaporous part became thin and formed the atmosphere in which we now live.

This atmosphere extends upward a distance of about fifty miles, the space beyond that being filled with a gas called ether. The ether is too thin to be measured by any instrument with

which man is familiar, but is known to transmit energy in the form of waves from the sun. The air is not dense enough to absorb much of the energy from these waves and therefore the earth receives it, becomes heated, and radiates back into the air most of the heat which it receives. In this way the air is warmed from the bottom upwards which explaines the freezing temperature of mountain tops, although they are nearer the sun than their bases. The temperature of the ether is suppose to be 459° F. below zero.

At a height of fifty miles the air is extremely thin and almost as cold as the ether. At a height of ten miles the temperature is the same summer and winter, probably not less than 60 below zero. At that distance absolute stillness reigns, for there is no medium dense enough to transmit sound. It is only the lower five or six miles, next to the earth, a comparatively small part of the entire fifty miles of atmosphere, that contains sufficient heat and moisture to satisfy the requirements of animal and vegetable life. Above that height it is impossible for man to live, and even a rise of two or three thousand feet from the surface of the earth reveals very noticeable changes in pressure and temperature. It is estimated that nearly one-half of the entire mass of air lies below the level of the top of Pike's Peak, a little less than three miles above sea level.

From this brief description let us now turn to the work of the Weather Bureau in making and recording daily observations of the conditions of the atmosphere.

This morning at eight o'clock, Washington time, observations were taken simultaneously at the one hundred and eighty stations in the United States and its island possessions. Records were made of readings of various standard instruments such as the barometer, the maximum aud the minimum thermometers, and the rain guage; and of the condition of the sky as to clouds and the direction and velocity of the wind.

By twenty minutes past eight the barometer readings had been reduced to sea level, necessary mathematical corrections had been made, records changed into cipher and filed at the local telegraph office. During the next forty minutes the observations, with right of way over all lines, were being transmitted from the various points to Washington and from there, each central station, such as Boston, was supplied with reports from all other stations. The object of the cipher is not secrecy but economy as three words usually contain the whole report.

By this system each central station can issue a map for the benefit of the people of its district. These maps may be seen in many public places and with a little study any intelligent person may forecast the weather from them with considerable accuracy.

Each station is represented on the map by a circle with an arrow through it. The arrow indicates the direction of the wind at that point. If the whole surface of the circle is clear it indicates a clear sky, if one-half is shaded it is partly cloudy and if it is wholly black it is entirely cloudy at that station. The letters R and S inside the circle represent rain and snow respectively.

Points of equal pressure are connected by heavy black lines called Isobars. Points of equal temperature are connected by dotted lines called Isotherms. The areas wholly enclosed

ARTHUR J. COX,
Manager of Foot-ball and Base-ball Teams

ALBERT M. FLETCHER,
Capt. of 1902 Foot-ball Team, Championship Winners.

WALTER L. BOYSON,
Captain Hockey, Track, and Base-ball Teams.

by the isobars represent the areas of highest and lowest pressure respectively, usually termed "Highs" and "Lows."

The process of making these maps is called the chalk plate process. On a plate about the size of the map is spread a layer of a chalk preparation. This preparation is rolled very hard but can be cut by a steel engraving point. As the reports are received from the different stations, impressions of the circles are made with the correct shading and the arrows flying in the right direction. The stations of equal pressure and temperature are connected by isobars and isotherms and areas where rain or snow has fallen during the past twenty-four hours are shaded. The map is then complete on the chalk. Melted type-metal is then run into the impression, making a plate about one-eight of an inch thick and from this the maps are printed.

By half past ten, about two and one-half hours after the observations are taken, the maps, showing the atmospheric condition all over the country, are printed and ready for distribution.

It is a well known fact that cold air is much heavier than hot; it is therefore natural that the air of the torrid zone, which heats much faster that that of other zones, should be constantly forced upward and replaced by the colder air which surrounded it. The warm air rises perhaps a mile or two, is partially cooled, and, under the influence of the winds, floats north or south, cooling as it goes. In the zone it comes down again, cooled and therefore much heavier, and slowly works its way back to the torrid zone to repeat the process and this keep up a circulation. This circulation may be illustrated by a very simple experiment.

Let the middle tube of the apparatus repsesent the torrid zone; the cross tube the space about miles above the surface of the earth and the two outside tubes regions far to the north and south of the equator. Being heated by the lamp the air in the middle tube is forced upward, cools off above, moves north or south, and finally comes down to the surface of the earth; the direction of the warm air being shown by the smoke. It then works back to the starting point and repeats the process.

This illustrates the simple principle of the general circulation of the air, called convectional circulation, although it is greatly complicated by the motion of the earth. If this were not so we of the north temperate zone should be continually subjected to north winds. But besides this general circulation there are local disturbances many of which may be attributed to the convectional theory on a smaller scale. These disturbances occur over the areas to which I have referred as highs and lows. The air in the low or hot areas is constantly being forced upward by the air from the high or colder areas. This produces a constant disturbance in the low area the violence of which varies with the difference in pressure between the high and the low. If the difference is very great strong winds will sweep over the country between the two areas spirally inward toward the center of the low and in a direction contrary to the movement of the hands of a watch, as shown in the left hand figure. The right hand figure represents the opposite conditions taking place in the high. The winds are

blowing spirally outward and in a direction corresponding to the hands of a watch.

The constant disturbance in the low and the rotary motion have given that area the name of cyclone. The characteristics of the high being exactly opposite to this it is called an anti-cyclone. It is mainly by watching these highs and lows and applying to them certain rules which experience has shown to be true, that our weather is forecast with such accuracy.

It has been found by observation that the highs and lows cross the country successively, at an average rate of six hundred miles a day; about fifty per cent. faster in winter than in summer. The period between them is about three days. In general anti-cyclones are preceded by clear cool weather and the cyclonic areas by warm wet weather as indicated by this chart.

There are three paths in which our storms generally move. About four-sevenths of them originate in the north plateau region of the Rocky Mountains and pass from that arid region directly eastward over the Great Lakes. These produce scanty rainfall. The greater part of the remaining three-sevenths come from the arid region of the south-western states and pass northeast to the St. Lawrence Valley. These may generally be depended on to give much rain and many of them cross the Atlantic and affect the weather of the Continent of Europe. The few remaining but by far the most severe storms start in the West Indies and travel north-west until they reach the South Atlantic coast of the United States; they then curve around and follow the seaboard. New England is crossed by all three of these paths, which accounts for our very changeable weather.

These are the general scientific rules which the amateur forecaster must keep in mind, but in addition to these there are many local rules which experience teaches him. Some of these are expressed by the weather proverbs in which people are apt to put considerable trust. A few of these sayings are based on fact, many of them entirely untrue.

We sometimes say of a fine day it is too good to last, thus recognizing the rapidity with which fair weather is followed by stormy. As storms approach people suffering from rheumatism feel an increase in their pain, not actually because of the storm but the increase in humidity in the cool southerly winds which precede the cyclonic areas. Smoke falls before a storm not because the air is lighter, as it is usually explained, but because the smoke particles are weighed down by the moisture collected upon them.

Scientific knowledge of the weather changes is but little greater now than it was ten years ago; and it is probable that we shall make no further advance until the upper air has been more carefully and accurately explored.

But in spite of that, scientific forecasting has now reached such a point of perfection that eighty per cent. of all the forecasts prove to be correct.

WALTER K. CABOT.

Cyclomic Storms and Winds.

One of the most important branches of the work of the Weather Bureau is the forecasting of those disagreeable and often dangerous weather changes called storms.

Most of us think of a storm as a heavy rain or snow-fall perhaps accompanied by high winds. To the mind of the weather expert, however, any low pressure area is a storm, as most storms accompany the low pressure areas, which are technically called cyclones.

Cyclonic storms in general can best be described by dividing them into two classes as determined by their geographical origin, namely, tropical cyclones, which have their origin in the torrid zone and extra-tropical cyclones which form further north.

Tropical cyclones may drift into the temperate zone but they still retain their distinguishing title.

The extra-tropical cyclone covers an area of several thousand square miles, it is accompanied by clouds and often by rain or snow, its winds however seldom attain destructive force except at sea.

Tropical cyclones are vast whirlwinds whose spiral inflowing currents attain destructive force as they approach the center. Those which visit our country usually form east of the West Indies and at the beginning they generally cover only a small area. As they travel West and North, curve into the Gulf of Mexico, and then recurve up the Atlantic sea-board, they increase in size and power until they often cover a circular area of 500 miles in diameter.

A description of one of these cyclones as observed at sea off the West Indies is rather interesting. Three or four days before the storm arrives, a slight rise in the barometer is noticed, preceded by a long rolling swell of the water which swings rapidly out from the storm on all sides.

When the barometric pressure is highest the wind dies away and clouds begin to form. Soon, however, the barometer falls and the wind begins to blow again. All these signs become more marked as the storm approaches. The clouds thicken, the wind increases to a gale, the waves rise on the sea, the dark low-lying clouds approach and rain begins to fall.

The barometer continues to sink slowly for a time, but at last falls rapidly. With this the wind increases to full hurricane strength, the lightning flashes and rain descends in torrents.

Underneath the heavy clouds the air is somewhat cooled by the rainfall, at the center of the storm, however, the temperature is unduly high. Here the clouds may dissolve and the sun shine brightly. This central space is therefore called the eye of the storm. As the center passes by all the elements of the cyclone reappear, occuring in the reverse order of their first appearance. In the course of a day or two, the barometer returns to its normal height, the wind dies away and the sky is left in its accustomed clearness.

Experience has taught our weather forecasters that these hurricanes must be carefully watched. That which wrecked Galveston in September, 1900, is a good example of their destructiveness. The storm started from Porto Rico on August 31, and moved northwest. After it had crossed Cuba and reached the coast of Florida, it veered off due west across the gulf and reached Galveston on Sept. 8. From Galveston it moved northwest to Iowa with a rapid loss of energy and then recurved

over the Great Lakes, where it caused gales of unusual violence.

This storm is one of the most important in the history of meteorology, not only on account of its almost unprecedented destructiveness, but also for the great success of the weather bureau in forecasting it throughout its entire course, warning signals being sent out in advance of the storm on five successive days, thereby saving a large amount of life and property, which would otherwise have been destroyed.

In spite of the warnings, however, the city of Galveston suffered almost complete destruction from the violence of the wind and the tidal wave which the cyclone caused to sweep over the city.

Another tropical cyclone which most of us can recall with some vividness, was the storm, which in November, 1898, wrecked the steamer Portland, off the Massachusetts coast. The day preceding the storm was calm and the air was filled with the penetrating chill that meant snow.

A snow storm at that time of year was nothing ususual, but few of us thought that a hurricane was coming up north, taking in as it whirled along the cold air from the northwest. Such was the case and with it came one of the most awful calamities known on the New England coast. Snow began falling soon after sunset and by ten o'clock the air itself seemed turned to snow. The gale was fast increasing and by midnight the wind was blowing seventy-five or eighty miles an hour. The destruction wrought by this storm was tremendous; ships were wrecked, lives lost by the hundreds and shores carved into new shapes.

Here again, however, the Weather Bureau rendered efficient service keeping in port hundreds of vessels which might have met the same fate as the Portland, had they ventured out.

In the central valleys of the United States and occasionally in other districts, great damage often results from tornadoes. Compared with the cyclone, in size, the tornado is insignificant, but when its intensity is considered, we find a tornado to be the more formidable.

It consists of a funnel-shaped cloud, which hangs from a greater cloud mass above, driven by violent vertical rotary motions of the air. With a deafening roar the whirling funnel advances, generally eastward or northward, at the rate of 20, 30 or 40 miles an hour, leaving destruction in its path.

The activity of a tornado may last only one-half hour, while it lays waste a path 5 to 20 miles long and commonly about one-quarter mile wide.

The whirl must attain a velocity greater than that of a rifle shot, for straws, carried by the wind, have been driven into an oak plank to the depth of half an inch. An instance is recorded of a brick entering a house through weather boarding, lath and plastering, crossing two rooms, a distance of 27 feet and lodging in the rear wall without even breaking corners from the brick.

From the large and circular hole through which the brick entered, it was thought that it must have had an extremely rapid rotary motion in its transit. During the same tornado an eye witness is said to have seen a house lifted and appear to go up into

the clouds. Only a small part of it was ever returned in such a shape as to be recognized.

Considering the strong ascending currents in tornadoes and their great supporting power, it is no wonder that great accumulations of rain are sustained for a while by these currents, and then on account of a sudden weakening or breaking up of the tornado, a great amount of rain should suddenly fall to the earth. Such rainfalls are called "Cloud Bursts," like that which occurred at Heppner, Oregon.

Both hurricanes and tornadoes are often accompanied by vivid electrical displays, but they would be classed as thunderstorms.

One of the least understood of all the meteorological phenomena is the electricity of the air. So far as we have observed, thunderstorms occur in the southwest portion of the extra-tropical cyclones as they move across the country, during the summer months. They consist of cloud masses of only from 10 to 100 miles in length and seem to be caused by the mixing of a body of cold air with air at a higher temperature. Their formation is usually indicated by the gathering of thick masses of clouds called thunder-heads, which mark the top of ascending currents of heated air, whose moisture is condensed as it reaches the colder temperature of the upper atmosphere. On the Atlantic coast thunder storms are often (caused) the result of a cool breeze from the sea which sets in late in the afternoon of a hot day when the temperature of the air has been to a degree almost unbearable.

The loss of life and property by lightning, which accompanies these storms, is so considerable that during recent years, special effort has been made to secure the best means of protection from lightning stroke. In large cities on account of the many buildings and electric wires, danger from lightning is reduced to a minimum and even in those districts where thunder storms are most prevalent there is usually much unneessary alarm. Statistics show that only one person in 50,000 is struck by lightning each year.

Few questions have been so thoroughly discussed from practical as well as theoretical standpoints as the certainty of the protection afforded by properly constructed lightning rods. Most treatises upon lightning up to within very recent times assumed that lightning followed the path of least resistance.

It is simply hopeless to pretend to be able to make the lightning conductor so much the easier path that all others are out of the question, the path will depend upon the nature of the flash. If the flash be of a certain character any part of a building is likely to be struck, whether there is a rod on the building or not, but the majority of flashes in our latitudes are not so intense but that a good lightning rod, well earthed, makes the most natural path for the flash and therefore renders very efficient protection.

Enough has been said of storms and their destructive power to show why we should all have a feeling of gratitude for the men who are spending their lives in studying the laws which govern their formation and progress, and in every way trying to shield humanity from some of the awful perils attendant upon storms.

William T. Royce.

Long Range Forecasting.

COLD WAVES.

AMONG the important factors to be considered by the weather man in forcastiug are the hot and cold waves, which, in summer, make suffering humanity seek the beaches and other cool resorts and in winter, compel that part of the public that can afford it, to seek warmer climes, while the remainder stick close to their own firesides in the city and wish for the summer once more. These hot and cold waves, which cause such varying conditions in our climate, are to the weather man only matters of high and low pressure areas.

When the charts indicate the formation of a body of dense cold air in the northwest, as shown by the barometer readings, the forecaster is on the alert.

He calls for special observations every four hours from the stations directly within the cold wave and in advance of it. As soon as the signs are suffiiently marked to indicate that the cold wave will sweep across the country with its usual attendant of damage to property, destruction to animal life and discomfort to humanity, the well arranged system of sending out warnings is brought into action. By this system which includes telegraph, telephone, flags, bulletins and other agencies, the people in every city, town and hamlet are notified of the advancing cold, perhaps twenty-four hours before it reaches them. These high pressure areas necessary for the production of a cold wave, drift into our territory from the northwest provinces of Canada, and are usually accompanied by the forming of low-pressure areas in the south or southeast part of the United States. The cold wave will travel southeastward in the direction of the low-pressure area just as if these two extremes had a mutual attraction for each other. The intense high-pressure areas are necessary parts of the cold wave because their whirling motion is so great as to draw down vast volumes of cold air from altitudes above the clouds, and it is from this source that the cold waves get their frigidity. It was formerly thought that these high pressure areas (cold waves) depended upon the land of their birth for the cold that they bring us, and that they were simply immense rivers of air that had been chilled by flowing over the great snow and ice fields of the Artic region, but, in consequence of the advancement of science in the matter of weather forecasting this supposition has been disproved.

All the Mississippi basin and the Atlantic States as far south as Florida may feel the blast of the cold wave as it comes sweeping down from the northwest; it is a clear, cold, dry wind, freezing the ground over which it advances and in consequence of a well known law of physics, warming somewhat in its own lower layers. This is particularly the case in the day time and in the early spring when there is no snow on the ground, but when the cold wave blows at night over a snow covered covered region the temperature of the air near the earth's surface decreases as it advances. When blowing at high velocity and bearing a blinding cloud of snow with the tempearture below freezing, the cold wave is called

a blizzard. The cold wave is a great boon to the health and spirits of humanity, for the cold, clear air, filled with the oxygen that it brings down from above the clouds, taking as it does the place of the air near the earth's surface which has been breathed by countless thousands, and is filled with the germs of disease from swamps and decaying substances; (increases one's energy and strength.)

HOT WAVES.

For the hot wave it is hard, however, to find a good word to say, for in general it is the forerunner of death and drought. For some unexplainable reason they come in summer, periods of stagnation in the drifts of the highs and the lows. At such times if a high rest over the fhe southeastern part of the country and a low over New England, there will result what is popularly known as a warm wave, for the air on account of its slightly greater specific gravity; will steadily and slowly flow from the southeast, where the pressure is greater, toward the northwest, where the pressure is less, and receiving constant additions of heat from the hot radiating surface of the earth, without any whirls or eddies to mix the upper or lower portions, will, after a few days, attain a temperature almost unbearable to animal life. This superheated condition of the lower portion in which we live continues until the low-pressure area in the northwest begins to move eastward mixing in its course atmosphere of unequal temperatures and causing the cool and welcome thunder showers.

In spite of Gray's warning: "where ignorance is bliss, 'tis folly to be wise," it is the dream of the meteorologist that some day he will be able accurately to forecast the weather weeks and months in advance. But so far this much desired object can be realized only in dreams. Mr. Moore, chief of the United States Weather Bureau believes it to be impossible for anyone today to make a forecast based fairly upon any principles of physics, for a greater period than two or three days in winter, or for more than three or four days in summer; there are times in winter when the movements of air are so rapid that it is extremely difficult to forecast even for the space of one day. There are plenty of people, however, who claim to be able to see far into the future through thc medium of some original weather guessing, The planets, the sun and the moon have been the most potent factors in the theories of these astrologers and long range weather forecasters who deceive many intelligent people into believing that it is possible for the adept to gain from the position and influence of the planets knowledge of certain storms in advance of their coming. It is a significant fact that no scientific man makes such a claim. No reliance whatever should be placed upon the forecasts contained in almanacs or other reports which claim to predict for weeks and months in advance. The long range prophets do not aguee as to whether their forecasts should be cold waves or hot waves as the result of the conjunction of the planets, neither do they agree on the dates of storms. But this does not discourage them in the least for there is always some storm on the map which each will use to verify his prediction, although he failed to name any date or to limit his territory. It is to be regretted that so many people, especially those in rural districts, place so much

reliance upon the predictions of these long range prophets, for by so doing they put the stamp of doubt upon scientific research in this direction and to some extent thereby retard its progress. In spite of these and other obstacles scientific research in the direction of weather forecasting is steadily advancing, and it will not be long before these long range prophets are forced out of busisess and compelled to seek other means for securing notoriety.

FREDERICK H. BURKE.

The Blue Hill Meteorological Station.

As has been described in the preceding papers, the forecasts of the Weather Bureau are made by means of reports received from stations which are seldom of great elevation above the earth's surface. It has now become very generally recognized that a knowledge of the varying atmospheric conditions, in regions of greater altitude, is of the utmost importance if the value and accuracy of these meteorological readings are to be increased.

For this purpose, in 1884, Mr. A. Lawrence Rotch, an enthusiastic student of meteorology purchased on Blue Hill, in Milton, a lot of land containing sixty acres, and here at an elevation of 635 feet above the sea level, the highest point on the Atlantic Coast of our country, an observatory has been erected for the purpose of making experimental studies for this section of the country. This station is supported by private subscriptions, but has been placed under the direct control of Harvard College, as the land upon which it stands, has been purchased by the Metropolitan Park Commission and this necessitated the change from a private to a public station.

The observatory is a two-story circular tower built of stone found upon the hill. In the erection of this building extreme care had to be exercised to insure solidity. The walls are twenty inches thick and the roof timbers are securely anchored to them. Yet, notwithstanding these precautions, it has been found impossible to make the walls impervious to the rain which at this high altitude is driven with great force by the wind.

At this observatory a study is made of the temperature, humidity, atmospheric pressure, and direction and velocity of the wind, in order to discover the influence of these conditions on weather changes. As an additional means of studying the upper atmosphere, observations of the number and height of clouds, their speed and direction of movement, are taken.

From the earliest periods of human existence and long before meteorology was recognized as a science, it has been one of man's greatest ambitions to learn of the conditions among the clouds. The same desire prevails today and the result is that investigations are prosecuted in various ways, by mountain observatories, by balloons and by kites.

At mountain observatories the methods employed are similar to those used at lower altitudes, but they are conducted under conditions which are exceedingly trying upon the physical powers of the observers.

The use of balloons in this study is growing rapidly.

Among the most famous ascents of the last century were those of Aerophile and Cirrus, who in 1893 and 1894 reached respectively, altitudes of 10 and 9 miles above sea level; and also that of Glaisher, in 1862 who ascended 6 miles, and of Berson, who in 1894 ascended 5 miles above the sea level. These men inhaled oxygen and so escaped suffering from the rarified air at these great heights. On the Eiffel Tower are instruments nine hundred and eighty feet above the ground and they make their records at a central office, a quarter of a mile distant, side by side, with records from similar instruments exposed near the ground.

History does not tell us when or in what manner kites were first introduced into scientific work. The earliest record of the work along this line, was that of the attempt of Dr. Alexander Wilson, of Edinboro, about 150 years ago. He fastened a thermometer to a kite which he flew to a high altitude thus finding the temperature of the clouds. Two years later without any knowledge of Dr. Wilson's experiment, Benjamin Franklin drew lightning from a thunder cloud by means of a kite string. But it was not until 1895 that the use of the kite for scientific purposes became widespread.

The style of kite which has been almost exclusively adopted by the observers at Blue Hill is that known as the "box kite." It may be described as two boxes of cloth, without ends, fastened together on the same frame but a little distance apart. This kite adjusts itself to great extremes of wind velocity and furnishes a cheap and ready means of exploring the atmosphere within a mile or more of the earth.

The instrument which is attached to the kite is called a meteorograph. It is very delicate, made of aluminum and weighs about 1 1-2 pounds. It consists of a metal cyclinder which by means of clock-work makes about one revolution in every twelve hours. About this cylinder is wound a sheet of paper upon which distinct records are made by means of pens which press against the paper as it revolves on the cylinder. One reading shows the humidity of the air, one the pressure, another the temperature, and the last the velocity of the wind. One of the chief difficulties experienced in the flying of kites was the inability of ordinary cord to hold them. Piano wire has been substituted and is found to be twice as strong, although only 1-6 the diameter.

The present method of controlling the wire is by means of a steam windlass. The compressive force upon the drum of this windlass is enormous but the pressure can be reduced by skilful windings. Before reaching its present degree of perfection, the regulator has passed through various stages of evolutions,—from the rude hand reel of far less delicate possibilities to the steam windlass now employed with such satisfactory results.

The fact that kites can be sent up from land only under favorable conditions has opened a new method of working. If a kite be flown from aboard a steamer it can go up almost under any conditions, because should there be no wind the motion of the steamer is sufficient to raise the kite

and should the wind be too great, the difficulty may be overcome by running the steamer with the wind.

Several experiments have been made by Mr. Rotch along this line and have been very successful. He is onw trying to induce the navy department to take up the work, believing this would prove of great benefit to future investigation. Although he has not been entirely successful he has created enough interest to have several private individuals commence this work and the German government has offered Mr. Rotch the use of a cruiser in order that he may carry out the flying of kites in mid-ocean.

As a result of these researches each year finds us in the possession of new facts; we have a more intelligent knowledge of the character of our storms, of the causes of our rainfall and of other meteorological phenomena. Slowly, but steadily, we are accumulating new evidence which either disproves old theories or establishes them more firmly. What results our new knowledge will effect, it is too early to state, but of this we feel confident, that the investigations of today will accomplish much towards increasing the world's slender stock of knowledge of this interesting and profitable study.

JOSEPH L. DUFFY.

Class History.

Read by E. C. Brooks at 1903 class supper, held June 15. Four years ago the class of 1903, while entering the Manual Training school contained over one hundred scholars including Merrill. No one would have thought from a glance at that stalwart bunch of youths that training school could be aught but a college for only ten-seventeenths of the class did not have intellectual foreheads or athletic feet.

The first thing given us in school was an English book and the education of a new teacher. He is now, through our efforts, the most highly respected English teacher of '03.

After this introduction to the school we made friends with the sophomores and tried their new cereal food sometimes called grass, they also used Force. We liked it so well that we favored '04 with some the next year, and they, although they did not relish it, ate sufficient to keep them green ever since. It is to be deplored that this great help in repressing fresh freshies ended with our kind efforts.

In our freshman year we allowed the football team to have only a few of our class; the rest were studying the latest approved methods of flamming and the instruction of code.

Then the hockey season came. So we had but two men, thereon the championship fought shy of the school, and later, when baseball came, we condescended to furnish the outfield.

In the class baseball series we began a habit of winning championships which we have followed ever since.

In a sudden inspiration L. Von Smeltzer Wruck, the class scientist, invented an article for use in the woodshop, which he called a round square. Peter Macdonough also won fame by chastising a fellow who was leaning over a woodshop bench. The fellow happened to be the instructor.

At the end of the year only seventy-five fellows remained, work, matri-

mony and so forth taking away the rest.

The following year the class returned, some with their fathers' well wishes, others with their fathers' pants, while the rest wore expanded chests. Befitting this increase of dignity class officers were elected, Stuart becoming president, Pinkey Harris, secretary and money-grabber, and Walley Boyson, sergeant at arms. Captain Boyson has manipulated that office ever since in a masterful manner. These and other things have made our class famous.

After greeting an important acquisition to our class in the person of a French Swede of German-Italian extraction named Hyme, we proceeded to choose red and gold as the colors of our class pin.

On the football team the number of '03 men commenced to increase and the quality commenced to rise in a corresponding degree.

When we came we cooly decided to win a championship. However, the best laid plans sometimes fool us and we forgot to beat one team, thereby only tying for the championship of the Interscholastic league.

This, however, got our blood up and we furnished some good material for a very satisfactory baseball team, one which was the first to receive decent support from the school body.

The class baseball series resulted in a walk-over for 1903.

In this year part of us absorbed the joys of the French language under Mme. Ellis, while others devoured it with all their Hart.

We finished our sophomore year filled with school enthusiasm—and froth pies—and when we came back for our third dose of learning, nothing short of staying away could have kept us out of school.

We began by offering the school enough football material to win all kinds of championships, but the team did not play as a unit and was not especially successful. A class football series was also run and '05, after tying with our team, refused to play again and thereby showed a spirit most uncommon to Training School.

When winter came, four from '03 played on the championship hockey team and began a good habit of league winning.

Next came baseball and a good part of the team were juniors. However, they played in hard luck and slipped up in both the triangular and interscholastic leagues.

The class baseball series resulted in a walk-over for 1903.

To finish their course of learning, a goodly number of youths and maidens came back as seniors with intentions of taking a chance on a diploma, Parry taking a special course in gunning. Every one had by this time become so old that only Shaw and Shepard's breath came in short pants.

The football team started off with only average prospects, but by drawing upon the resources of his class, Fletcher managed, with the help of one man each from the other classes, to captain a team which did not meet defeat throughout the season.

The hockey season also gave '03 a chance to shine, Captain Boyson, being one of four seniors to play on this championship team.

In baseball all but two are from our class and this team, as everyone knows, is far from being the tailenders of the league. In the class baseball

team we met our first defeat in school for three years. The trick was done by the instructors and Mr. Morse.

Not only in athletics has '03 excelled, but as any of the teachers would gladly say, the seniors of this year are among the most intellectual and promising set of Danvers candidates ever turned out from the school.

Out of the large class which entered, thirty-five will graduate, many having dropped out while looking for work.

The funds to carry on this class supper were procured by means of A Confidence Game, which we played upon a number of easy-marks in April. Since then the magicians of the general division have been planning to turn a whole supper into a class of fellows.

The subject for the graduating exercises is the work of the United States Weather Bureau and while the subject may be interesting enough the Bureau managed to get in some pretty poor work for today.

And now it will not be long before we are all separated and then, some studying, some in business, and some working, we may all be thinking, thinking of those dear old times in school and there will come ringing back to us a familiar voice saying, "See me at two o'clock," "How old are you anyhow?" or "Go to the office."

BAUX. '03

Methods used in operating the Lincoln Wharf Power House of the Boston "L" system.

This power house, recently completed, is the finest station of its kind in this section of the country.

It is operated by the most approved methods, including mechanical stoking. This last named method suggests that the use of coal is involved, and that it must be carried from the vessel to the furnaces.

Let us follow the path of the coal; it is first hoisted from the vessel's hold to the top of the coal bunker on the wharf, and from there it is shot into several pockets. From any one of these pockets it is loaded into the buckets of an endless chain bucket conveyor, by which it is conveyed to a smaller storage bin, above the boilers, in the boiler room.

The coal is taken from this bin, and by gravity is carried through a chute shaped much the same as one made by placing the spouts of two funnels together and then flattening their mouths. From the lower end of each funnel, there being one funnel to each furance, it is fed to the fires by a steel plunger, operated automatically by an auxiliary engine. The grates are shaken, when necessary, by hand, the frequency depending upon the quality of the coal. The ashes are carried out and dumped by the same system of buckets as they return for more coal.

Having seen where the coal comes from and how the fires are fed, let us now follow the course of the feed water from the time it leaves the city main until it is exhausted as condensed steam.

From the main, under city pressure, it flows to the primary heater, which consists of a large iron cylinder, in which is a coil of pipe through which the water flows and around this coil is a mass of steam; where this steam

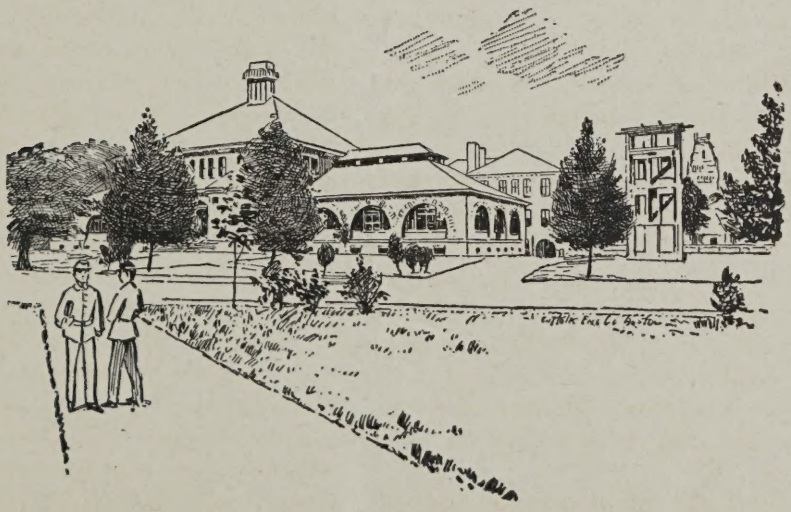
comes from will be explained later. Here the water is heated to a temperature of about 120 degrees F., it then flows to the secondary heater, this differs from the primary in that it is vertical instead of horizontal, the water comes in at the top and trickles down over plates set at an angle to the sides of the heater. It is thus brought in direct contact with the steam which comes from the auxiliary engines and is heated to about 180 degrees F. From here it is pumped through the enconomizer into the boilers. The economizer is a large rectangular stack, in which are a great many vertical tubes, the water has to pass through these tubes and is heated to 230 degrees F. by the hot gases coming from the furnaces before they go into the stack outside.

When the water enters the boilers it is several degrees hotter than the boiling point, in the boilers it is changed into steam and then passes through the superheater on the way to the engines. The superheater is nothing but a coil of pipes situated just back of the furnaces and around which the gases pass before going to the economizer. The superheater takes the moisture out of the steam, making it very dry, the dryer the steam the better results obtained from the engines.

After leaving the engines the steam passes through the primary heater and then to the condenser from which it is pumped as water and mixed with the salt water used in condensing it, into the harbor.

The electricity furnished by this station is used on the elevated system, and one can easily see that nothing is wasted that can possibly be used in any way.

G. R. M., '03.



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